

FIG. 1

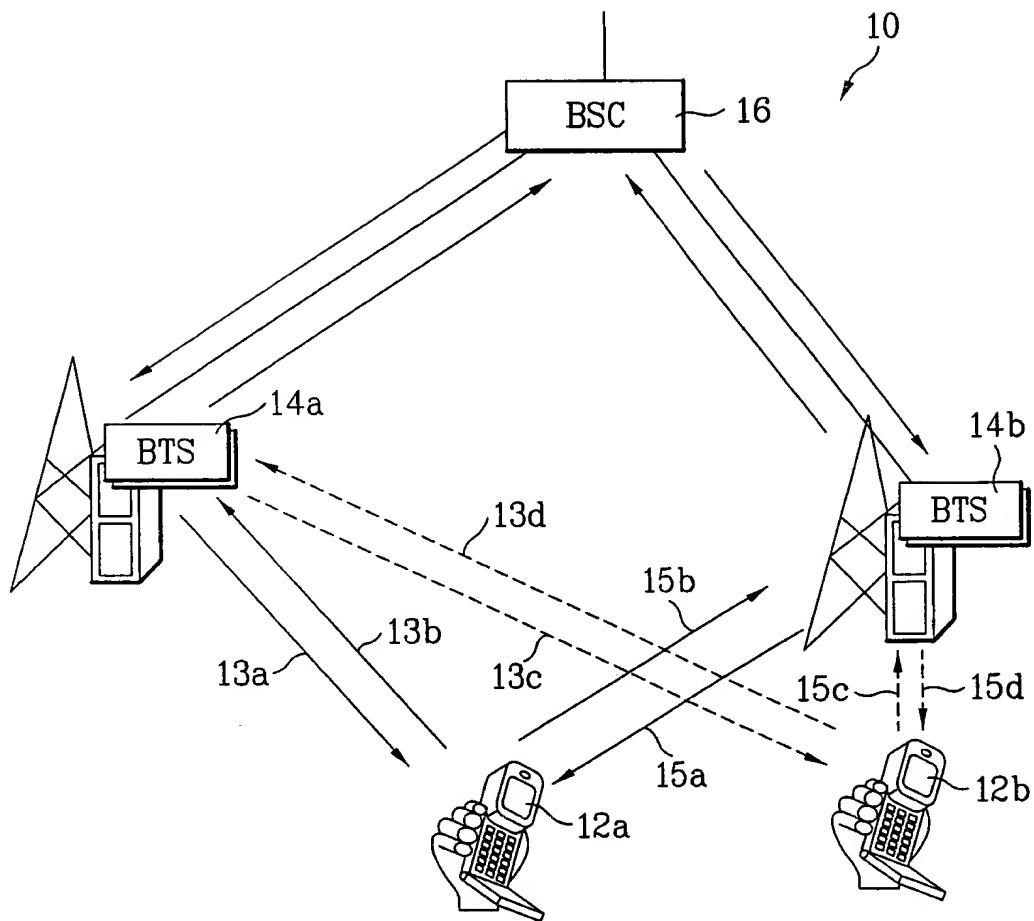




FIG. 2

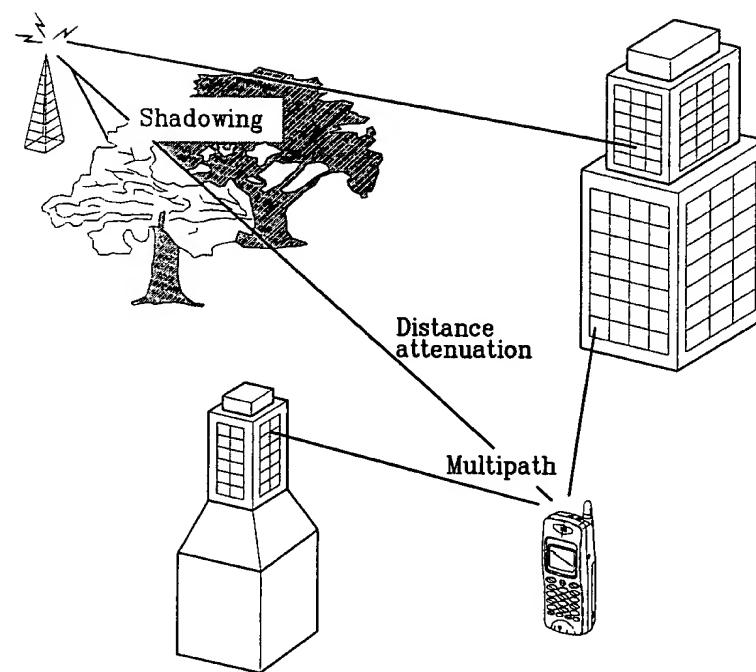
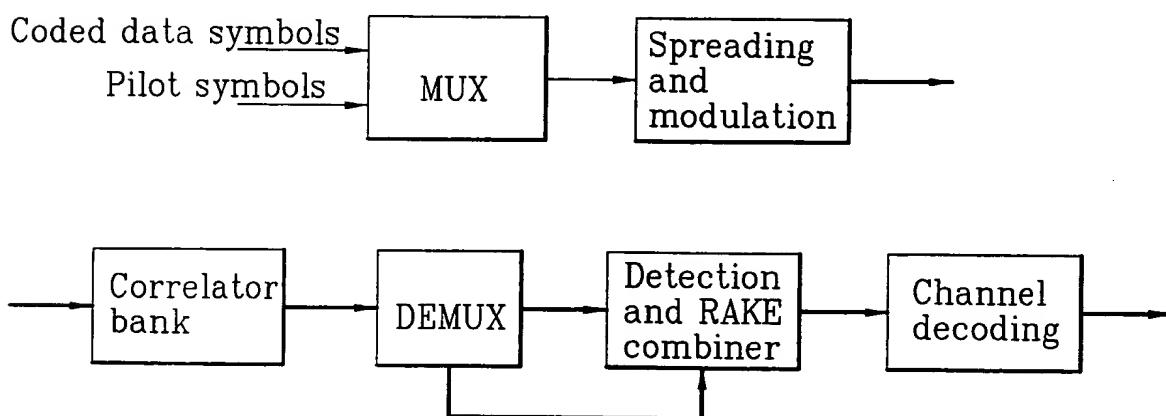
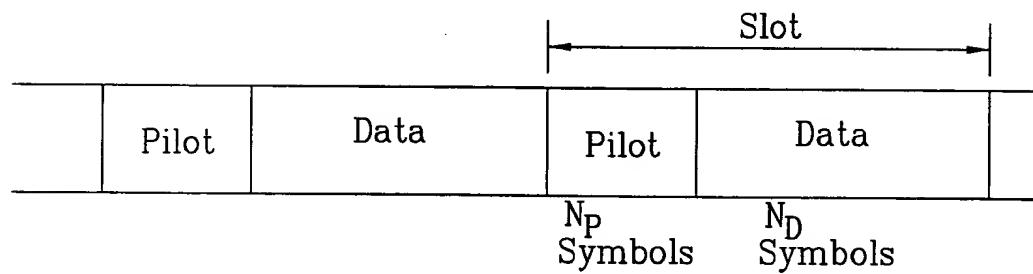


FIG. 3



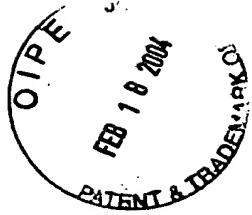


FIG. 4

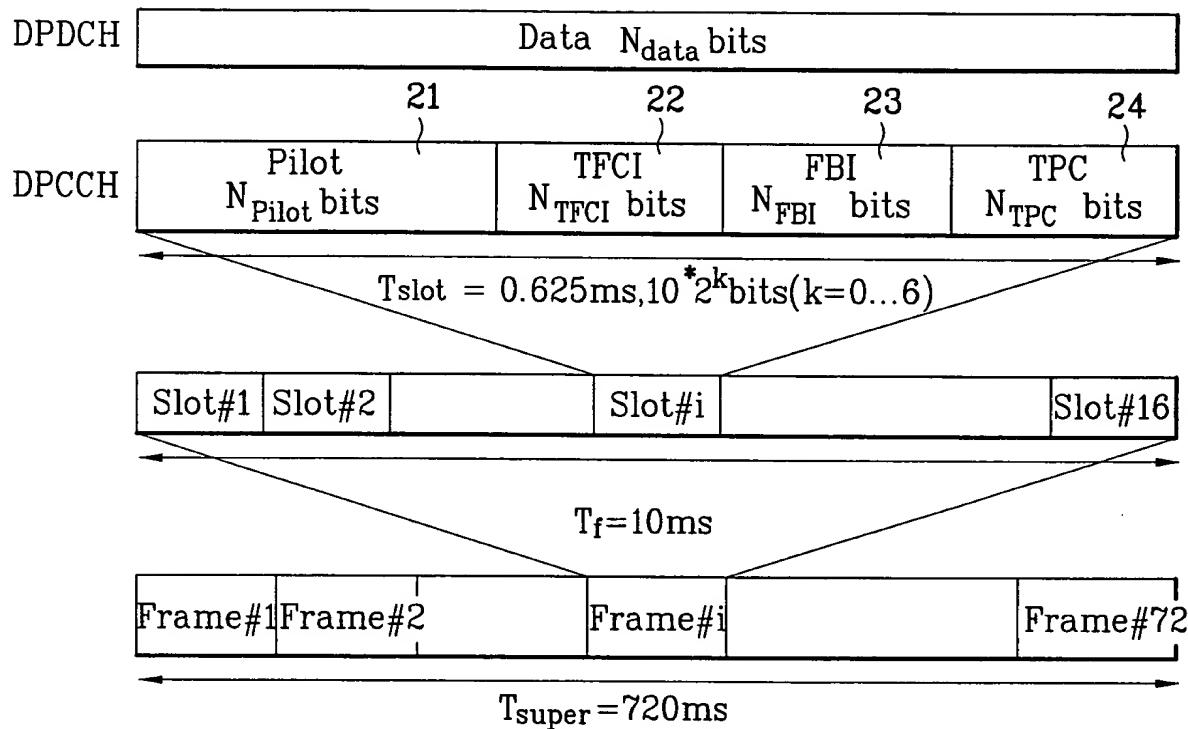


FIG. 5

Channel Bit Rate(kbps)	Channel Symbol Rate(ksp/s)	SF	Bits/Frame	Bits/Slot	N_{pilot}	N_{TPC}	N_{TFCI}	N_{FBI}
16	16	256	160	10	6	2	2	0
16	16	256	160	10	8	2	0	0
16	16	256	160	10	5	2	2	1
16	16	256	160	10	7	2	0	1
16	16	256	160	10	[6]	[2]	[0]	[2]
16	16	256	160	10	[5]	[1]	[2]	[2]

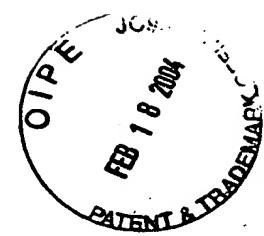
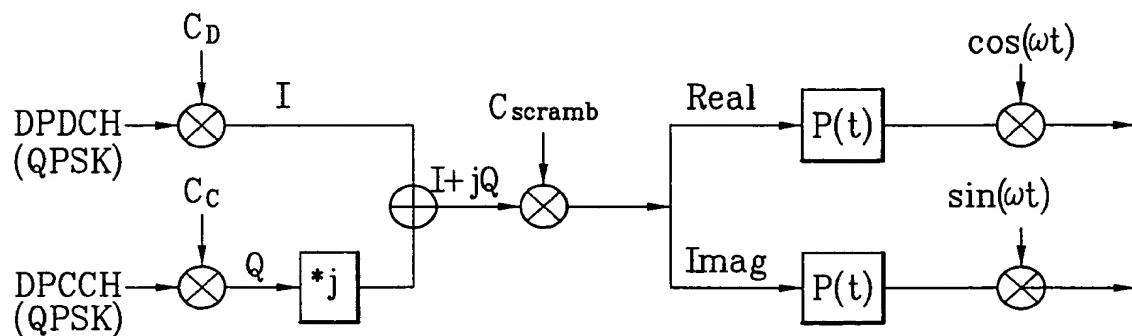


FIG. 6

Bit #	N _{pilot} =6						N _{pilot} =8							
	0	1	2	3	4	5	0	1	2	3	4	5	6	7
slot #1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	0	1	1	1	1	1	1	0	1	1
3	1	0	1	1	0	1	1	0	1	1	1	0	1	1
4	1	1	0	1	0	1	1	1	1	0	1	0	1	1
5	1	1	0	1	1	1	1	1	1	0	1	1	1	1
6	1	1	0	1	1	1	1	1	1	0	1	1	1	1
7	1	0	1	1	0	0	1	0	1	1	1	0	1	0
8	1	1	0	1	0	1	1	1	1	0	1	0	1	1
9	1	1	1	1	0	0	1	1	1	1	1	0	1	0
10	1	0	1	1	0	1	1	0	1	1	1	0	1	1
11	1	1	1	1	1	0	1	1	1	1	1	1	1	0
12	1	0	1	1	0	1	1	0	1	1	1	0	1	1
13	1	0	0	1	0	1	1	0	1	0	1	0	1	1
14	1	1	0	1	0	0	1	1	1	0	1	0	1	0
15	1	0	1	1	0	0	1	0	1	1	1	0	1	0
16	1	0	0	1	0	0	1	0	1	0	1	0	1	0

FIG. 7



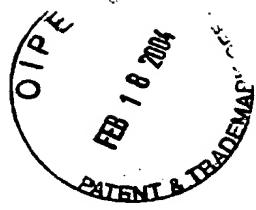


FIG. 8

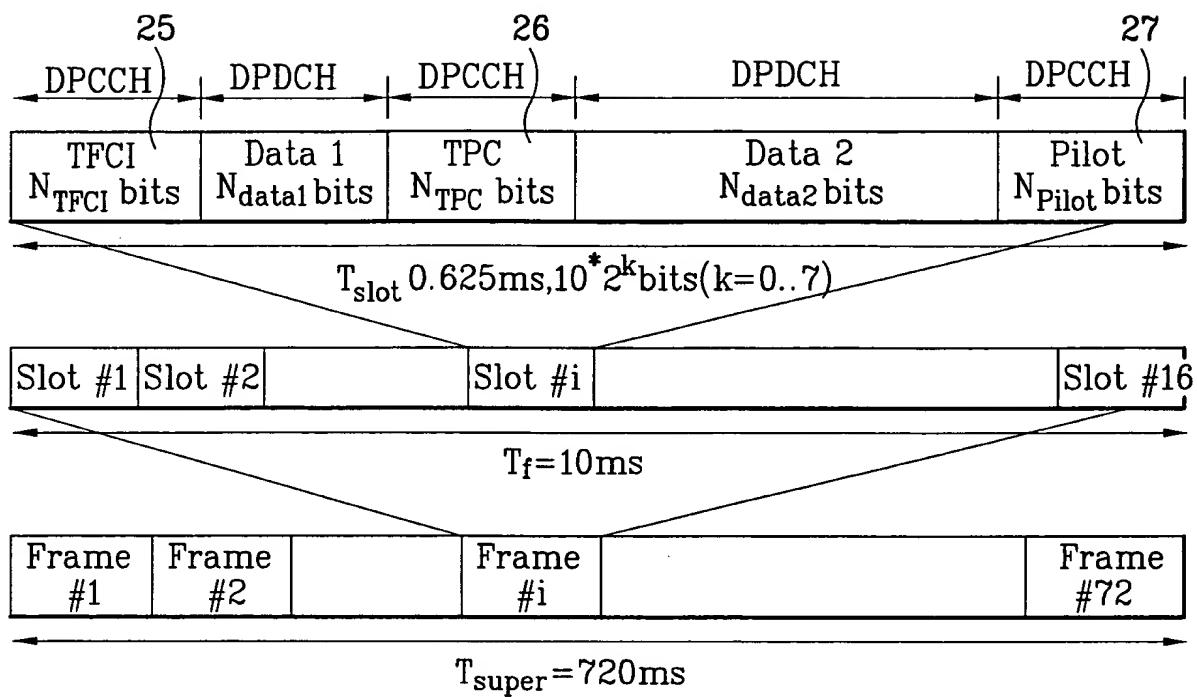


FIG. 9

Symblo rate	8ksps		16,32,64,128ksps				256,512,1024ksps							
Symblo #	0	1	0	1	2	3	0	1	2	3	4	5	6	7
Slot #1	11	11	11	11	11	11	11	11	11	11	11	11	10	
2	11	11	11	11	11	01	11	10	11	10	11	10	11	01
3	11	10	11	01	11	01	11	10	11	01	11	11	11	01
4	11	01	11	10	11	01	11	11	11	01	11	00	11	10
5	11	10	11	10	11	11	11	11	11	00	11	01	11	10
6	11	10	11	10	11	11	11	11	11	11	11	01	11	10
7	11	01	11	01	11	00	11	10	11	11	11	01	11	10
8	11	00	11	10	11	01	11	01	11	00	11	10	11	00
9	11	00	11	11	11	00	11	11	11	10	11	00	11	01
10	11	10	11	01	11	01	11	01	11	11	11	11	11	00
11	11	10	11	11	11	10	11	10	11	10	11	11	11	10
12	11	11	11	01	11	01	11	01	11	10	11	10	11	00
13	11	10	11	00	11	01	01	11	10	11	11	11	11	10
14	11	11	11	10	11	00	11	00	11	10	11	10	11	00
15	11	00	11	01	11	00	11	01	11	10	11	00	11	00
16	11	00	11	00	11	01	00	11	00	11	00	11	00	11

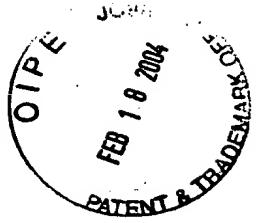
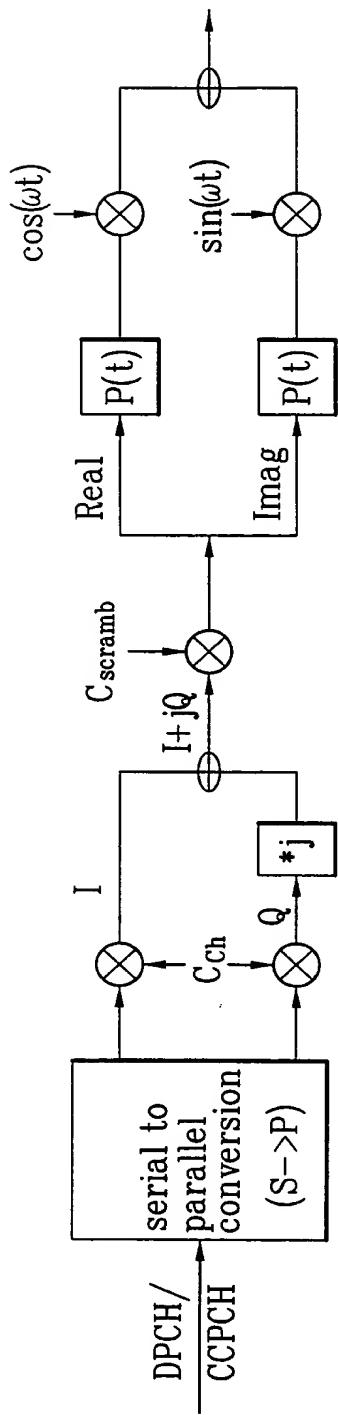


FIG. 10



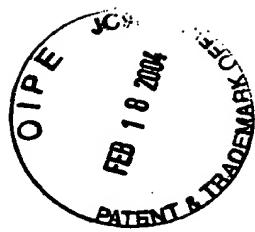


FIG. 11A

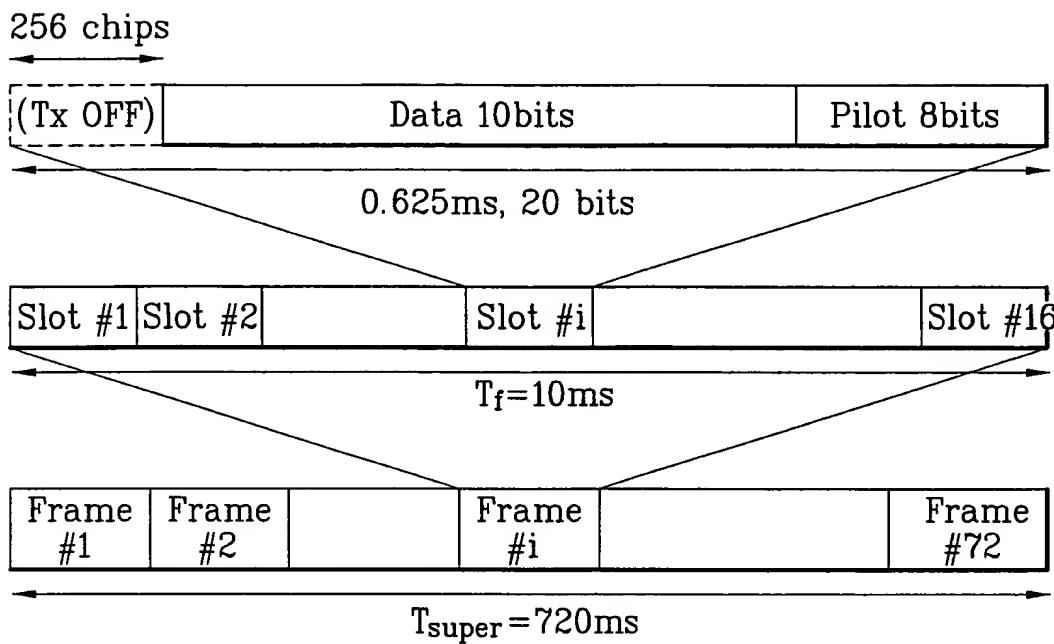
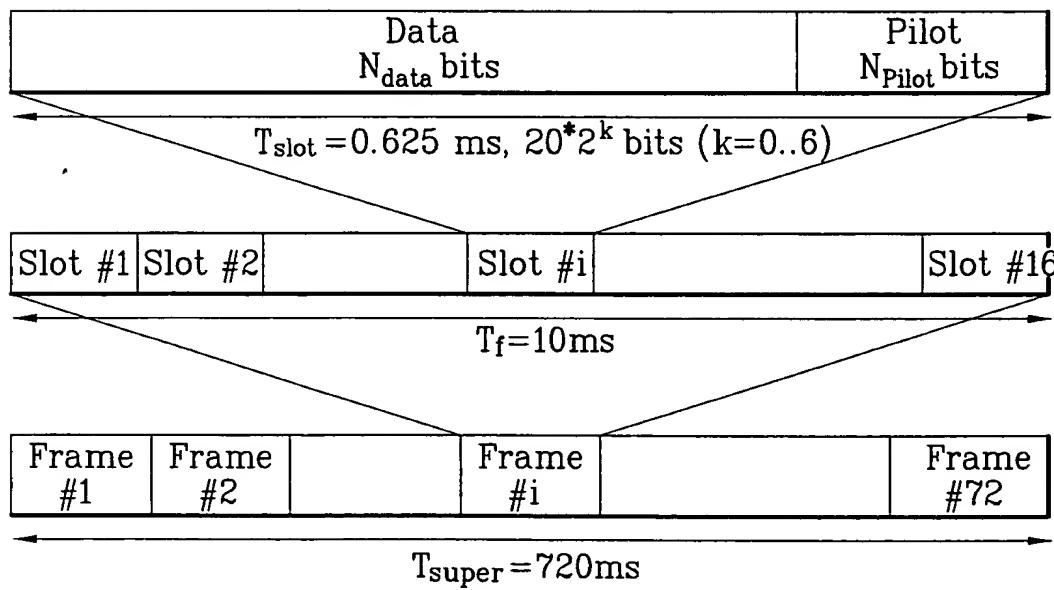


FIG. 11B



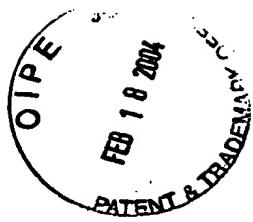


FIG. 12A

Frame Synchronization Words									
Slot Number	1	2	3	4	5	.....	L		
C ₁	(	1	1	0	1	1	1	1)
C ₂	(	1	0	0	0	1	0	1)
C ₃	(	1	1	0	1	1	1	0)
C ₄	(	0	1	1	1	0	1	1)
C ₅	(	1	0	1	1	0	0	0)
C ₆	(	1	1	1	0	0	1	0)
C ₇	(	0	1	0	0	0	1	1)
C ₈	(	1	1	1	0	1	0	0)

FIG. 12B

$R(\tau) \ \tau$	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$R_E(\tau)$	16	4	0	4	0	-4	0	-4	-16	-4	0	-4	0	4	0	4
$R_F(\tau)$	16	-4	0	-4	0	4	0	4	-16	4	0	4	0	-4	0	-4
$R_G(\tau)$	16	4	0	-4	0	4	0	-4	-16	-4	0	4	0	-4	0	4
$R_H(\tau)$	16	-4	0	4	0	-4	0	4	-16	4	0	-4	0	4	0	-4

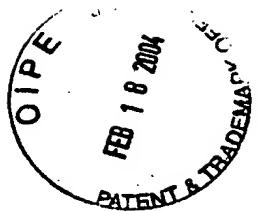


FIG. 13A

$$R_E(\tau) + R_F(\tau), \text{ or } (R_G(\tau) + R_H(\tau))$$

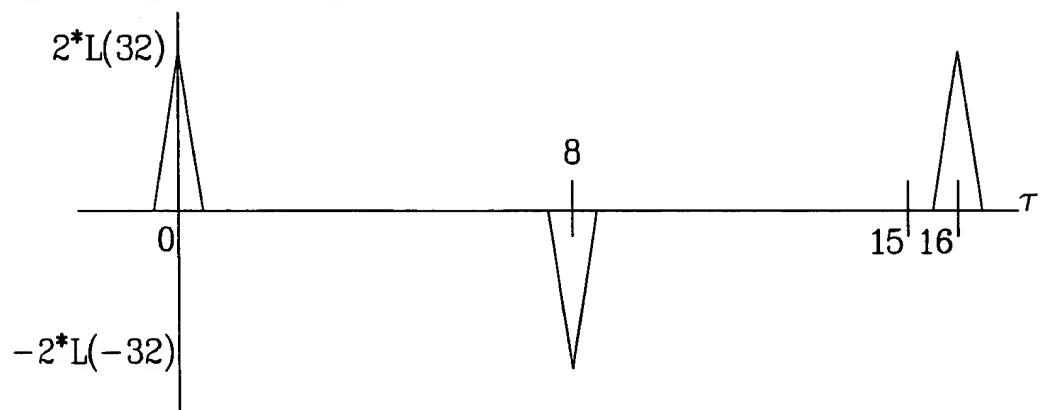
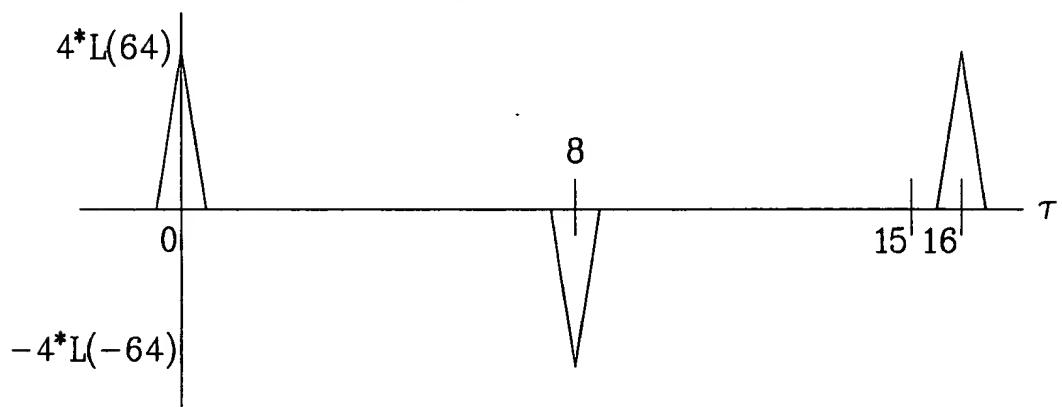


FIG. 13B

$$R_E(\tau) + R_F(\tau), + (R_G(\tau) + R_H(\tau))$$



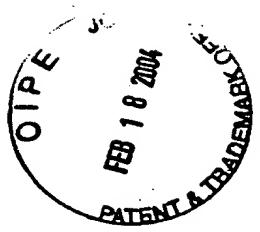


FIG. 14A

Bit #	N _{pilot} = 5					N _{pilot} = 6					
	0	1	2	3	4	0	1	2	3	4	5
Slot #1	1	1	1	1	0	1	1	1	1	1	0
2	1	0	1	1	1	1	1	0	1	1	1
3	0	0	1	0	1	1	0	0	1	0	1
4	1	0	1	1	1	1	1	0	1	1	1
5	1	1	1	1	0	1	1	1	1	1	0
6	1	0	1	1	1	1	1	0	1	1	1
7	1	1	1	0	1	1	1	1	1	0	1
8	1	0	1	0	0	1	1	0	1	0	0
9	0	0	1	0	1	1	0	0	1	0	1
10	0	1	1	0	0	1	0	1	1	0	0
11	1	1	1	1	0	1	1	1	1	1	0
12	0	1	1	0	0	1	0	1	1	0	0
13	0	0	1	0	1	1	0	0	1	0	1
14	0	1	1	0	0	1	0	1	1	0	0
15	0	0	1	1	0	1	0	0	1	1	0
16	0	1	1	1	1	1	0	1	1	1	1

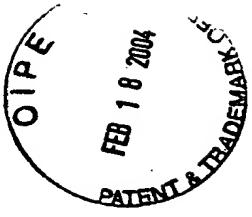


FIG. 14B

Bit #	N _{pilot} = 7							N _{pilot} = 8							
	0	1	2	3	4	5	6	0	1	2	3	4	5	6	7
Slot #1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0
2	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1
3	1	0	0	1	0	1	1	1	0	1	0	1	0	1	1
4	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1
5	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0
6	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1
7	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1
8	1	1	0	1	0	0	1	1	1	1	0	1	0	1	0
9	1	0	0	1	0	1	1	1	0	1	0	1	0	1	1
10	1	0	1	1	0	0	1	1	0	1	1	1	0	1	0
11	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0
12	1	0	1	1	0	0	1	1	0	1	1	1	0	1	0
13	1	0	0	1	0	1	1	1	0	1	0	1	0	1	1
14	1	0	1	1	0	0	1	1	0	1	1	1	0	1	0
15	1	0	0	1	1	0	1	1	0	1	0	1	1	1	0
16	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1

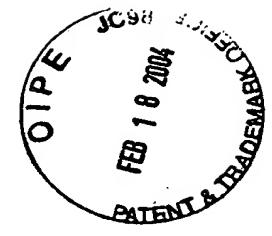


FIG. 14C

N _{pilot}	Pilot bit position #	Corresponding word of lenght 16
5	0	C ₁
	1	C ₂
	3	C ₃
	4	C ₄
6	1	C ₁
	2	C ₂
	4	C ₃
	5	C ₄
7	1	C ₁
	2	C ₂
	4	C ₃
	5	C ₄
8	1	C ₁
	3	C ₂
	5	C ₃
	7	C ₄

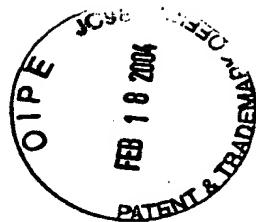
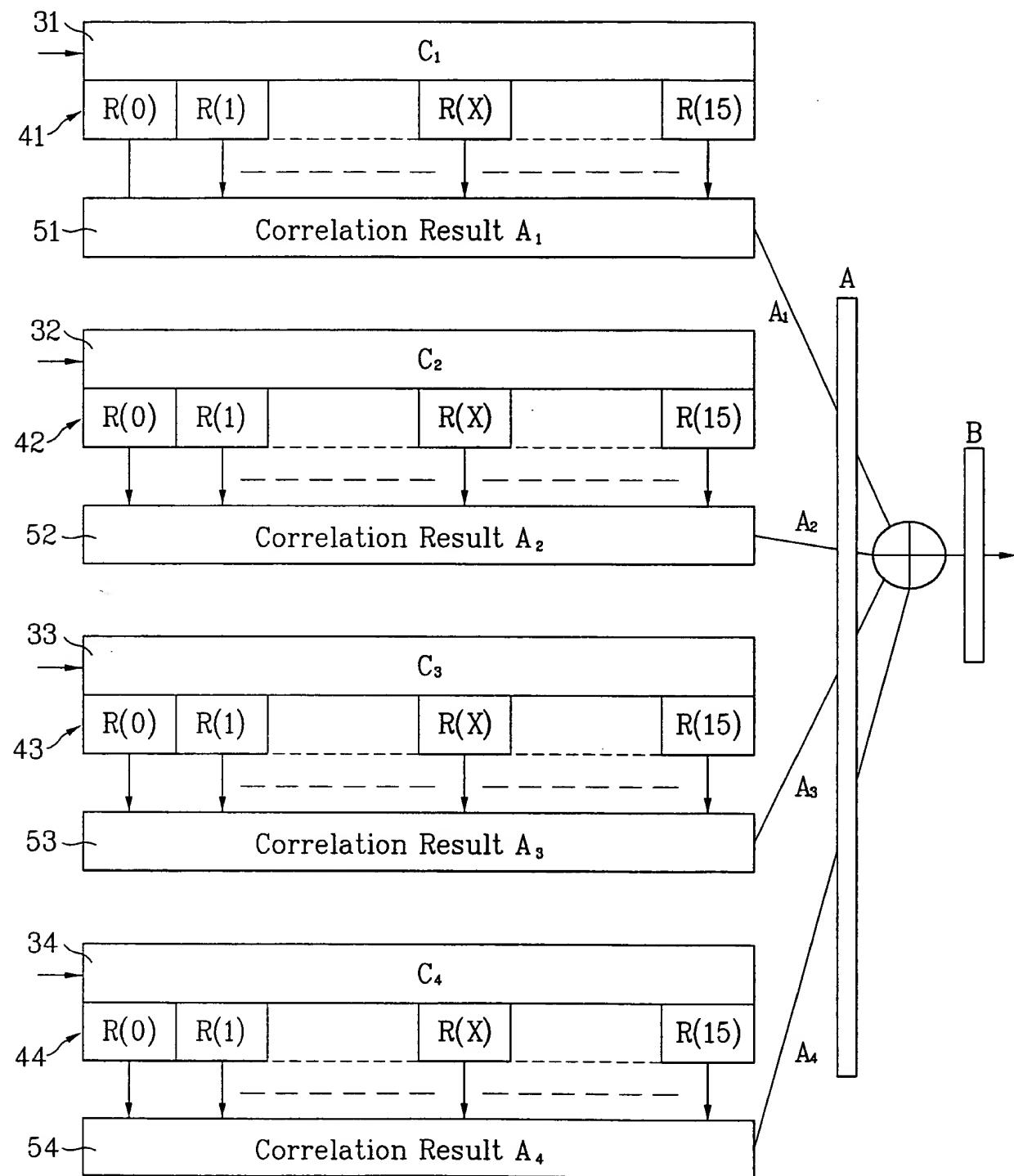


FIG. 14D



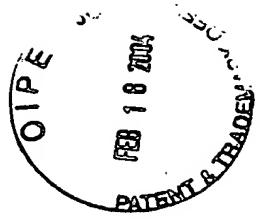


FIG. 14E

	R _x (0)	R _x (1)	R _x (2)	R _x (3)	R _x (4)	R _x (5)	R _x (6)	R _x (7)	R _x (8)	R _x (9)	R _x (10)	R _x (11)	R _x (12)	R _x (13)	R _x (14)	R _x (15)
A ₁ POINT	16	4	0	4	0	-4	0	-4	-16	-4	0	-4	0	4	0	4
A ₂ POINT	16	-4	0	-4	0	4	0	4	-16	4	0	4	0	-4	0	-4
A ₃ POINT	16	4	0	4	0	-4	0	-4	-16	-4	0	-4	0	4	0	4
A ₄ POINT	16	-4	0	-4	0	4	0	4	-16	4	0	4	0	-4	0	-4
B POINT	64	0	0	0	0	0	0	0	-64	0	0	0	0	0	0	0

FIG. 14F

	R _x (0)	R _x (1)	R _x (2)	R _x (3)	R _x (4)	R _x (5)	R _x (6)	R _x (7)	R _x (8)	R _x (9)	R _x (10)	R _x (11)	R _x (12)	R _x (13)	R _x (14)	R _x (15)
A ₁ POINT + A ₂ POINT	32	0	0	0	0	0	0	0	-32	0	0	0	0	0	0	0
A ₃ POINT + A ₄ POINT	32	0	0	0	0	0	0	0	-32	0	0	0	0	0	0	0
A ₁ POINT + A ₄ POINT	32	0	0	0	0	0	0	0	-32	0	0	0	0	0	0	0
A ₂ POINT + A ₃ POINT	32	0	0	0	0	0	0	0	-32	0	0	0	0	0	0	0



FIG. 14G

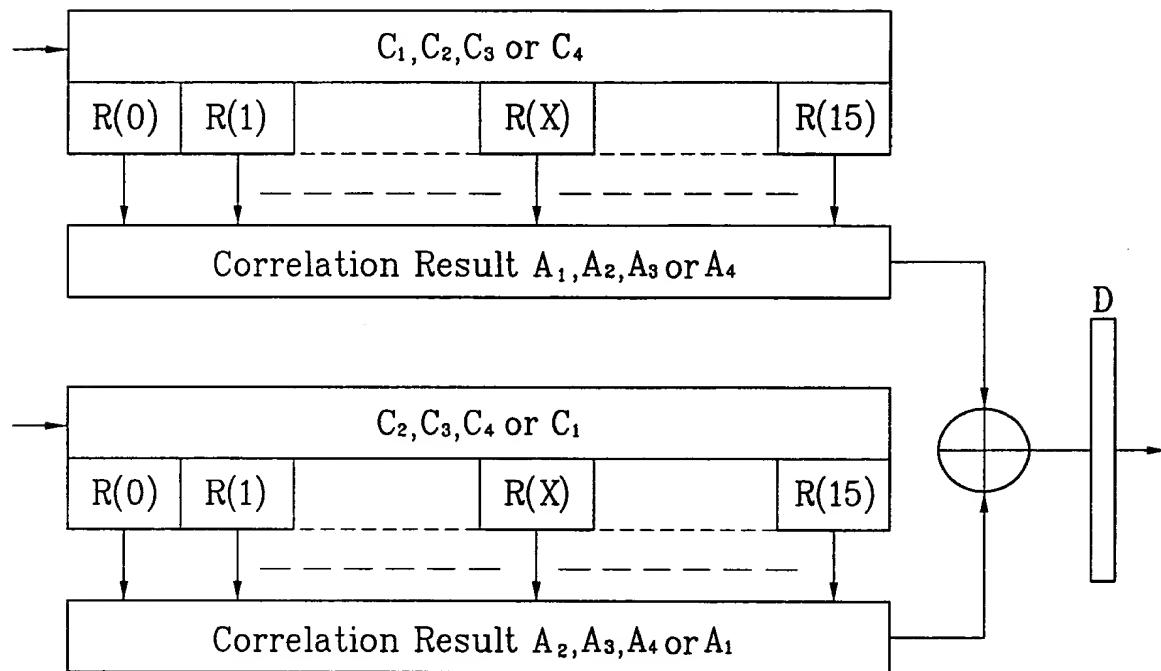
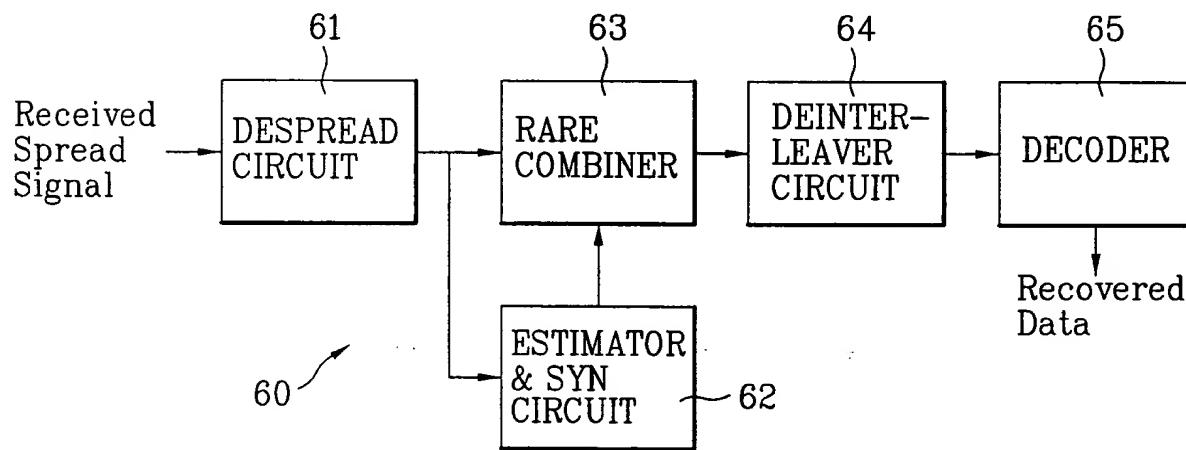


FIG. 14H



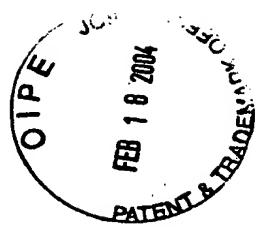
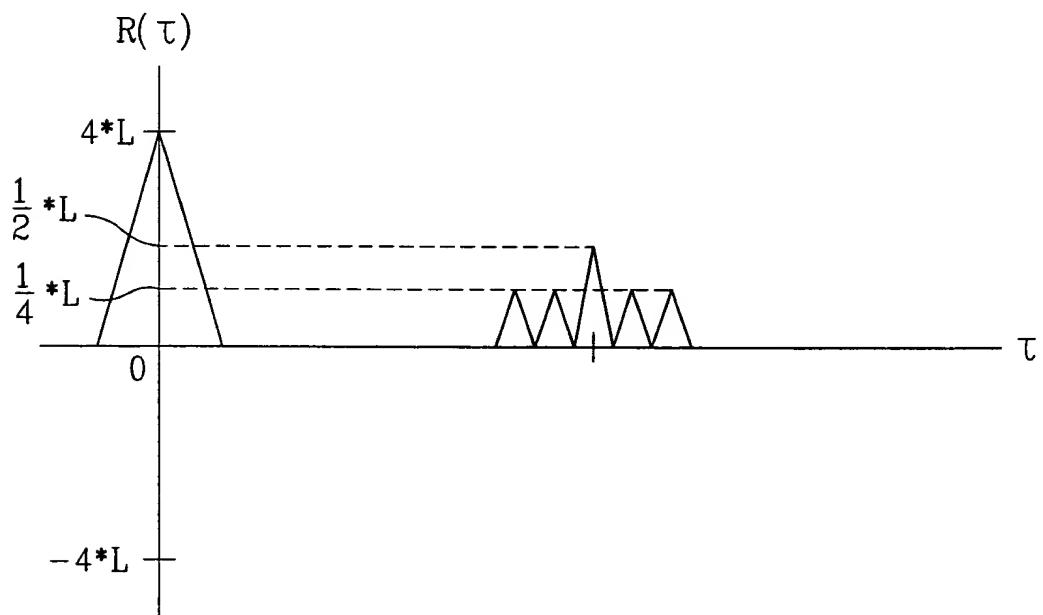


FIG. 14I

	$R_x(0)$	$R_x(1)$	$R_x(2)$	$R_x(3)$	$R_x(4)$	$R_x(5)$	$R_x(6)$	$R_x(7)$	$R_x(8)$	$R_x(9)$	$R_x(10)$	$R_x(11)$	$R_x(12)$	$R_x(13)$	$R_x(14)$	$R_x(15)$
A ₁ POINT	16	-4	-4	8	0	-4	0	0	-4	0	0	-4	0	8	-4	-4
A ₂ POINT	16	0	0	-4	-4	-4	0	0	12	0	0	-4	-4	-4	0	0
A ₃ POINT	16	4	0	0	4	8	8	0	0	0	8	8	4	0	0	4
A ₄ POINT	16	0	4	-4	0	0	-4	4	0	4	-4	0	0	-4	4	0
B POINT	64	0	0	0	0	0	4	4	8	4	4	0	0	0	0	0

FIG. 14J



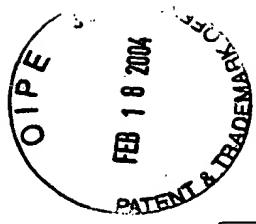


FIG. 15A

Symbol #	$N_{\text{pilot}} = 4$		$N_{\text{pilot}} = 8$				$N_{\text{pilot}} = 16$							
	0	1	0	1	2	3	0	1	2	3	4	5	6	7
Slot #1	11	11	11	11	11	10	11	11	11	10	11	11	11	01
2	11	10	11	10	11	11	11	10	11	11	11	01	11	11
3	11	00	11	00	11	01	11	00	11	01	11	11	11	01
4	11	10	11	10	11	11	11	10	11	11	11	10	11	00
5	11	11	11	11	11	10	11	11	11	10	11	00	11	01
6	11	10	11	10	11	11	11	10	11	11	11	01	11	00
7	11	11	11	11	11	01	11	11	11	01	11	00	11	10
8	11	10	11	10	11	00	11	10	11	00	11	01	11	11
9	11	00	11	00	11	01	11	00	11	01	11	00	11	10
10	11	01	11	01	11	00	11	01	11	00	11	10	11	00
11	11	11	11	11	11	10	11	11	11	10	11	00	11	10
12	11	01	11	01	11	00	11	01	11	00	11	01	11	11
13	11	00	11	00	11	01	11	00	11	01	11	11	11	10
14	11	01	11	01	11	00	11	01	11	00	11	10	11	11
15	11	00	11	00	11	10	11	00	11	10	11	11	11	01
16	11	01	11	01	11	11	11	01	11	11	11	10	11	00

FIG. 15B

Symbol rate	Symbol #	Channel	Corresponding word of length L=16
$N_{\text{pilot}} = 4$	1	I-CH	C ₁
		Q-CH	C ₂
$N_{\text{pilot}} = 8$	1	I-CH	C ₁
		Q-CH	C ₂
	3	I-CH	C ₃
		Q-CH	C ₄
$N_{\text{pilot}} = 16$	1	I-CH	C ₁
		Q-CH	C ₂
	3	I-CH	C ₃
		Q-CH	C ₄
	5	I-CH	C ₅
		Q-CH	C ₆
	7	I-CH	C ₇
		Q-CH	C ₈

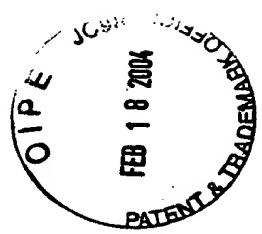
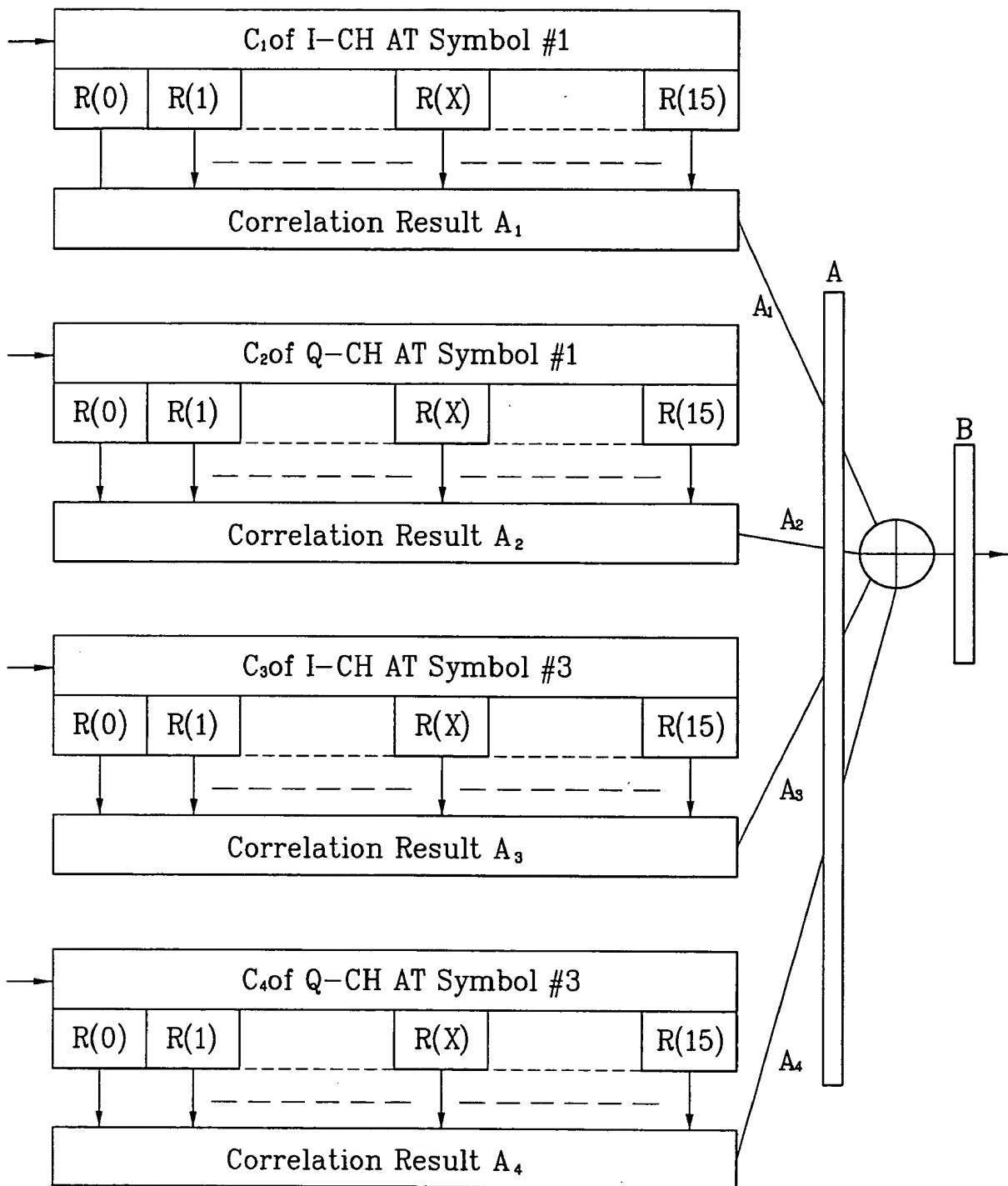


FIG. 15C



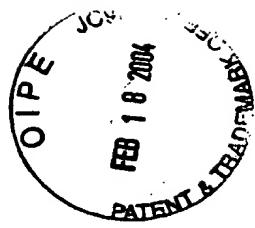


FIG. 16A

Symbol #	0	1	2	3
Slot #1	11	11	11	10
2	11	10	11	11
3	11	00	11	01
4	11	10	11	11
5	11	11	11	10
6	11	10	11	11
7	11	11	11	01
8	11	10	11	00
9	11	00	11	01
10	11	01	11	00
11	11	11	11	10
12	11	01	11	00
13	11	00	11	01
14	11	01	11	00
15	11	00	11	10
16	11	01	11	11

FIG. 16B

Symbol #	Channel	Corresponding word of length 16
1	I-CH	C ₁
	Q-CH	C ₂
3	I-CH	C ₃
	Q-CH	C ₄

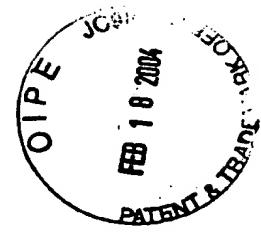


FIG. 16C

Symbol rate	$N_{\text{pilot}} = 8$				$N_{\text{pilot}} = 1$							
Symbol #	0	1	2	3	0	1	2	3	4	5	6	7
Slot #1	11	11	11	10	11	11	11	10	11	11	11	01
2	11	10	11	11	11	10	11	11	11	01	11	11
3	11	00	11	01	11	00	11	01	11	11	11	01
4	11	10	11	11	11	10	11	11	11	10	11	00
5	11	11	11	10	11	11	11	10	11	00	11	01
6	11	10	11	11	11	10	11	11	11	01	11	00
7	11	11	11	01	11	11	11	01	11	00	11	10
8	11	10	11	00	11	10	11	00	11	01	11	11
9	11	00	11	01	11	00	11	01	11	00	11	10
10	11	01	11	00	11	01	11	00	11	10	11	00
11	11	11	11	10	11	11	11	10	11	00	11	10
12	11	01	11	00	11	01	11	00	11	01	11	11
13	11	00	11	01	11	00	11	01	11	11	11	10
14	11	01	11	00	11	01	11	00	11	10	11	11
15	11	00	11	10	11	00	11	10	11	11	11	01
16	11	01	11	11	11	01	11	11	11	10	11	00

FIG. 16D

Symbol rate	Symbol #	Channel	Corresponding word of length L=16
$N_{\text{pilot}} = 8$	1	I-CH	C ₁
		Q-CH	C ₂
	3	I-CH	C ₃
		Q-CH	C ₄
$N_{\text{pilot}} = 16$	1	I-CH	C ₁
		Q-CH	C ₂
	3	I-CH	C ₃
		Q-CH	C ₄
	5	I-CH	C ₅
		Q-CH	C ₆
	7	I-CH	C ₇
		Q-CH	C ₈

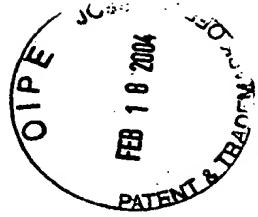


FIG. 17A

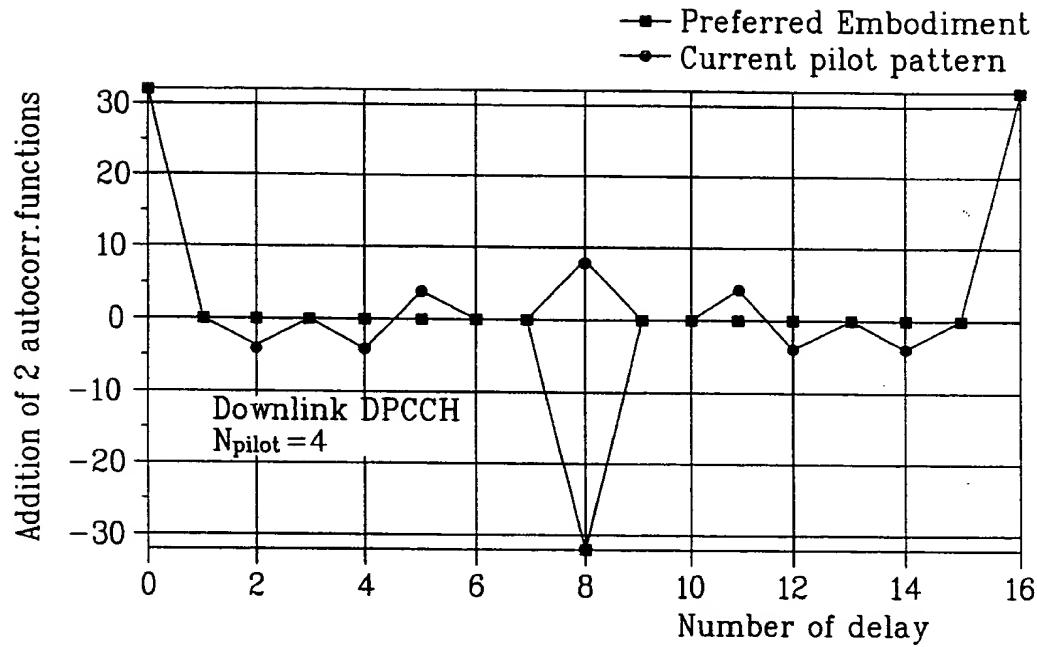
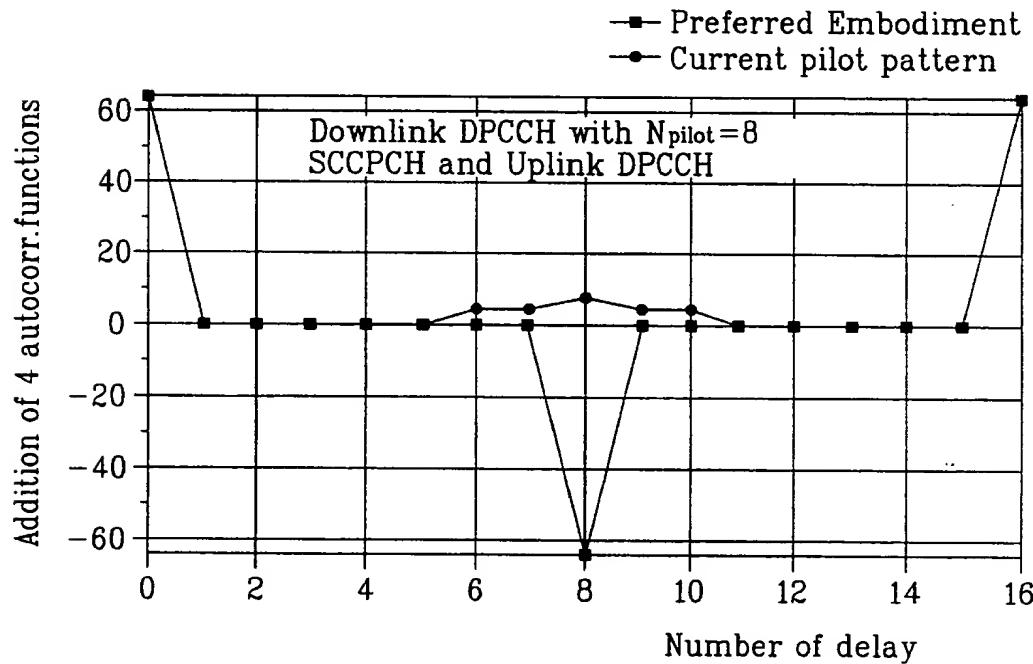


FIG. 17B



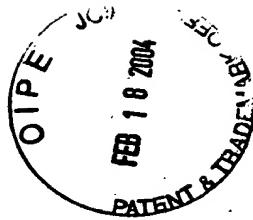


FIG. 17C

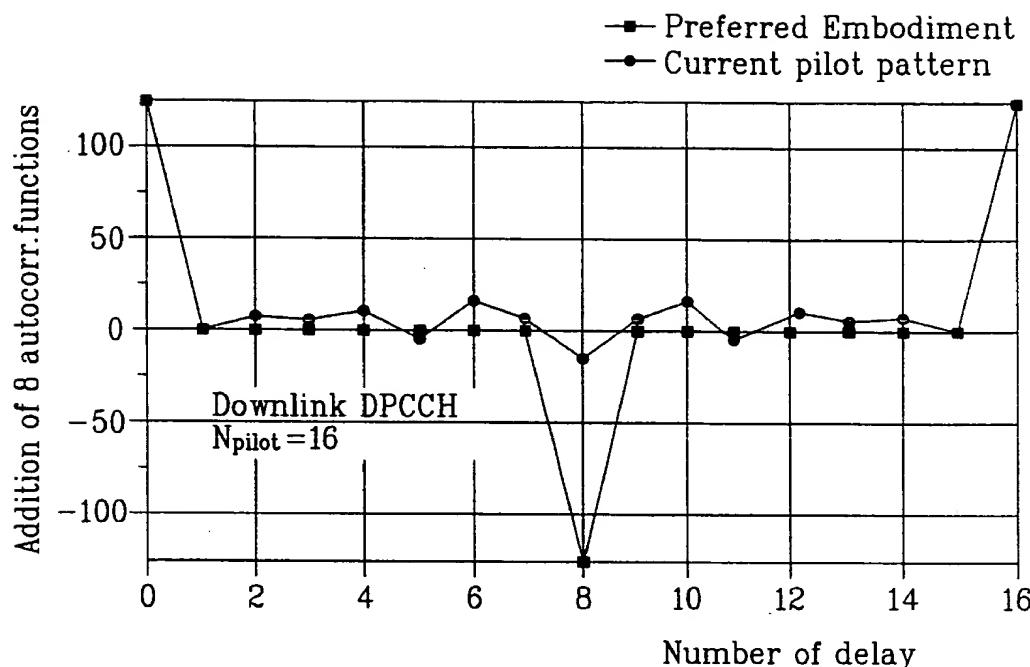


FIG. 18A

Parameters	Downlink
Slot per frame	16
Number of bits in the DPCCH (Pilot/TPC/TFCI)	4/2/0
Number of bits in the DPDCH per each slot	4
Spreding factor (DPDCH)	512
Spreding factor (DPCCH)	512
Modulation	QPSK
3dB bandwidth	4.096MHz
Shaping filter	Root raised cosine (roll off 0.22)
Power amplifier	Ideal
Propogation channel	AWGN

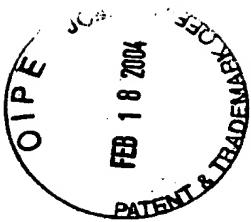


FIG. 18B

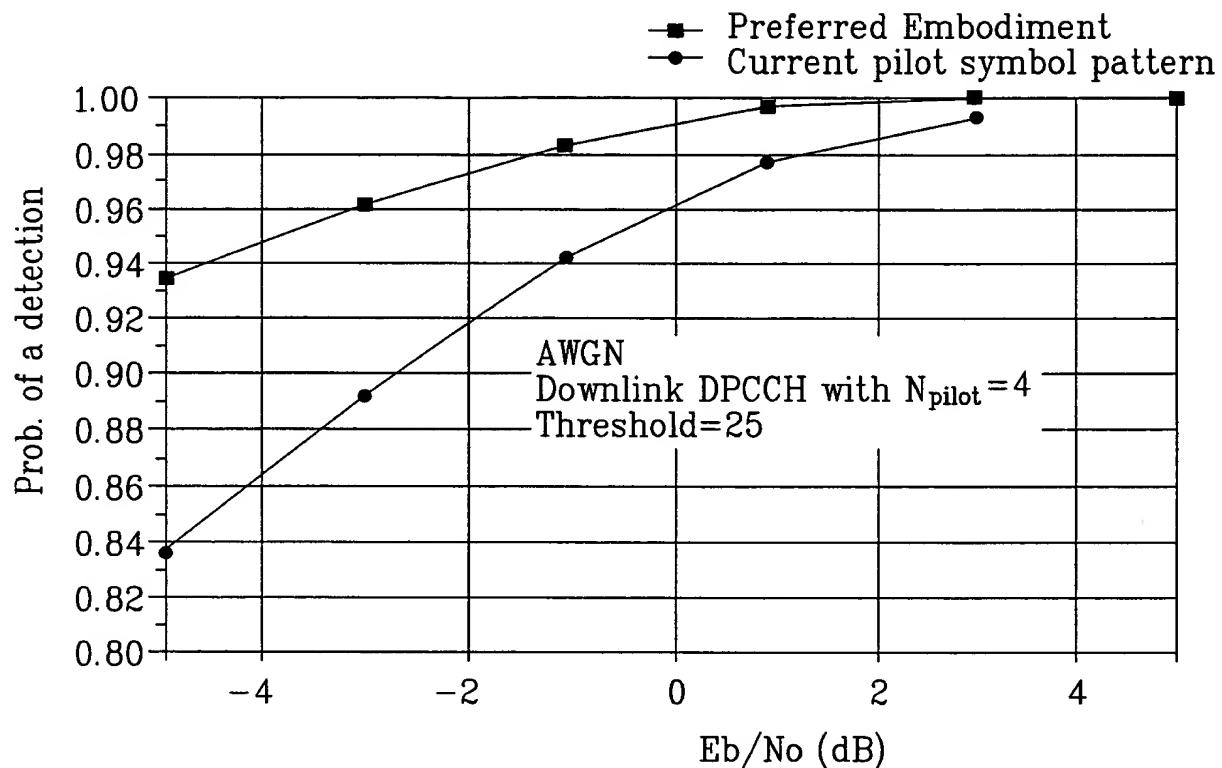
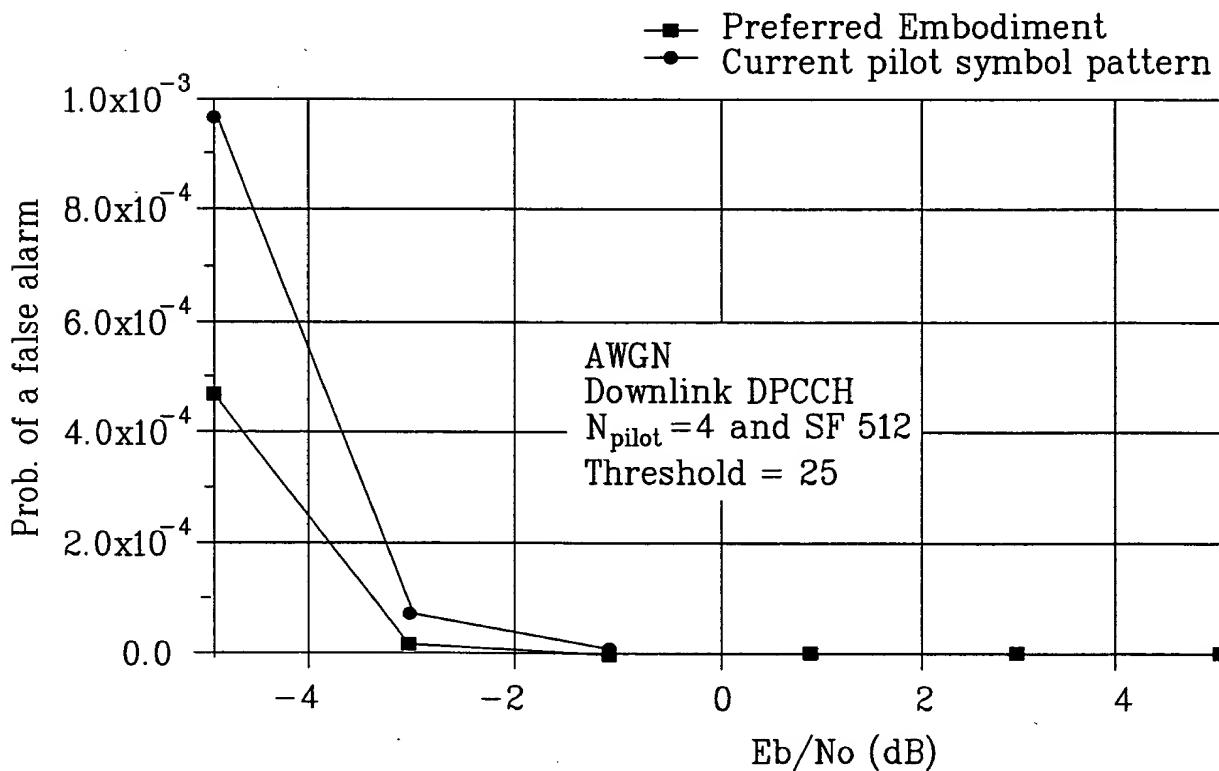
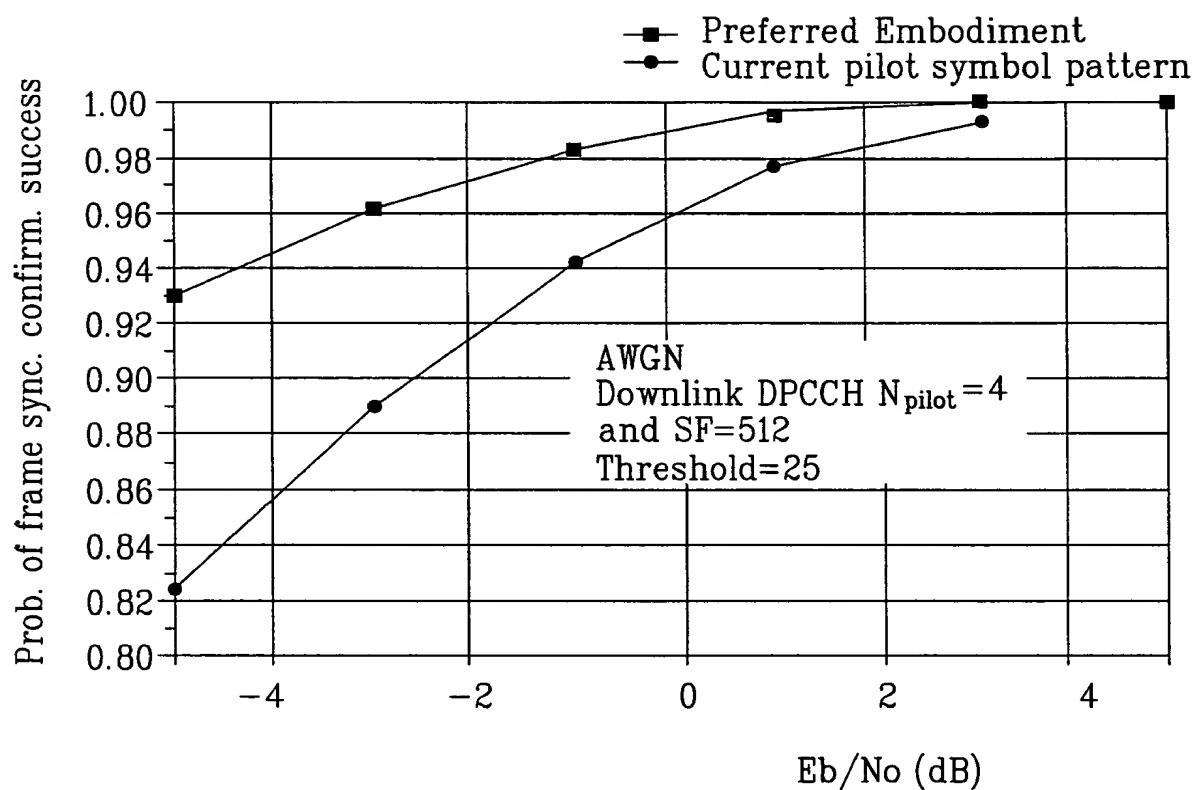


FIG. 18C



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FIG. 18D



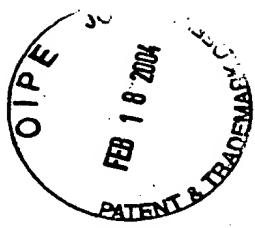


FIG. 19A

	Npilot = 4		Npilot = 8			Npilot = 16								
Symbol #	0	1	0	1	2	3	0	1	2	3	4	5	6	7
Slot #1	01	10	11	00	00	10	11	00	00	10	11	11	00	10
	00	10	11	01	00	11	11	01	00	11	11	01	00	00
	10	10	11	11	00	01	11	11	00	01	11	11	00	10
	00	10	11	01	00	11	11	01	00	11	11	10	00	11
	01	10	11	00	00	10	11	00	00	10	11	11	00	01
	00	10	11	01	00	11	11	01	00	11	11	10	00	00
	01	10	11	11	00	10	11	11	00	10	11	00	00	01
	00	10	11	10	00	11	11	10	00	11	11	01	00	00
	10	10	11	11	00	01	11	11	00	01	11	00	00	01
	11	10	11	10	00	00	11	10	00	00	11	10	00	11
	01	10	11	00	00	10	11	00	00	10	11	00	00	01
	11	10	11	10	00	00	11	10	00	00	11	01	00	00
	10	10	11	11	00	01	11	11	00	01	11	00	00	10
	11	10	11	10	00	00	11	10	00	00	11	01	00	11
	10	10	11	10	00	01	11	10	00	00	11	01	00	10
	11	10	11	10	00	00	11	10	00	00	11	01	00	11

FIG. 19B

Symbol rate	Symbol #	Channel	Corresponding word of length 16
Npilot = 4	0	I - CH	-C ₁
		Q - CH	C ₂
Npilot = 8	1	I - CH	-C ₃
		Q - CH	C ₄
	3	I - CH	C ₁
		Q - CH	-C ₂
Npilot = 16	1	I - CH	-C ₃
		Q - CH	C ₄
	3	I - CH	C ₁
		Q - CH	-C ₂
	5	I - CH	-C ₇
		Q - CH	C ₈
	7	I - CH	C ₅
		Q - CH	-C ₆

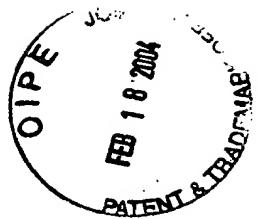


FIG. 19C

Symbol #	0	1	2	3
Slot #1	11	11	00	01
2	11	10	00	00
3	11	00	00	10
4	11	10	00	00
5	11	11	00	01
6	11	10	00	00
7	11	11	00	10
8	11	10	00	11
9	11	00	00	10
10	11	01	00	11
11	11	11	00	01
12	11	01	00	11
13	11	00	00	10
14	11	01	00	11
15	11	00	00	01
16	11	01	00	00

FIG. 19D

Symbol rate	Channel	Corresponding word of length 16
1	I - CH	C_1
	Q - CH	C_2
3	I - CH	$-C_3$
	Q - CH	$-C_4$

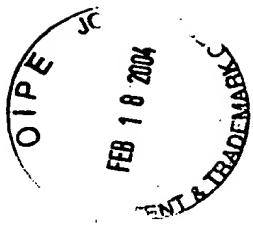


FIG. 19E

Symbol #	Npilot = 8				Npilot = 16							
	0	1	2	3	0	1	2	3	4	5	6	7
Slot #1	11	00	00	10	11	00	00	10	11	11	00	10
2	11	01	00	11	11	01	00	11	11	01	00	00
3	11	11	00	01	11	11	00	01	11	11	00	10
4	11	01	00	11	11	01	00	11	11	10	00	11
5	11	00	00	10	11	00	00	10	11	11	00	01
6	11	01	00	11	11	01	00	11	11	10	00	00
7	11	11	00	10	11	11	00	10	11	00	00	01
8	11	10	00	11	11	10	00	11	11	01	00	00
9	11	11	00	01	11	11	00	01	11	00	00	01
10	11	10	00	00	11	10	00	00	11	10	00	11
11	11	00	00	10	11	00	00	10	11	00	00	01
12	11	10	00	00	11	10	00	00	11	01	00	00
13	11	11	00	01	11	11	00	01	11	00	00	10
14	11	10	00	00	11	10	00	00	11	01	00	11
15	11	00	00	01	11	00	00	01	11	11	00	10
16	11	01	00	00	11	01	00	00	11	10	00	11

FIG. 19F

Symbol rate	Symbol #	Channel	Corresponding word of length 16
Npilot = 8	1	I - CH	-C ₃
		Q - CH	C ₄
	3	I - CH	C ₁
		Q - CH	-C ₂
Npilot = 16	1	I - CH	-C ₃
		Q - CH	C ₄
	3	I - CH	C ₁
		Q - CH	-C ₂
	5	I - CH	-C ₇
		Q - CH	C ₈
	7	I - CH	C ₅
		Q - CH	-C ₆

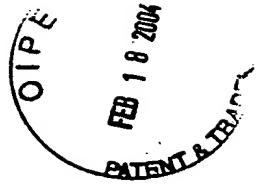


FIG. 20A

Sequence	Autocorrelation
$C_1 = (1\ 1\ 0\ 1\ 1\ 1\ 1\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0)$	16 4 0 4 0 -4 0 -4 -16 -4 0 -4 0 4 0 4
$C_2 = (1\ 0\ 0\ 0\ 1\ 0\ 1\ 0\ 0\ 1\ 1\ 0\ 1\ 0\ 1)$	16 -4 0 -4 0 4 0 4 -16 4 0 4 0 -4 0 -4
$C_3 = (1\ 1\ 1\ 1\ 1\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0)$	16 4 0 4 0 -4 0 -4 -16 -4 0 -4 0 4 0 4
$C_4 = (0\ 1\ 0\ 1\ 0\ 0\ 0\ 1\ 1\ 0\ 1\ 0\ 1\ 1\ 1\ 0)$	16 -4 0 -4 0 4 0 4 -16 4 0 4 0 -4 0 -4
$C_5 = (0\ 0\ 1\ 1\ 1\ 0\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 0\ 0)$	16 4 0 -4 0 4 0 -4 -16 -4 0 4 0 -4 0 4
$C_6 = (0\ 0\ 1\ 0\ 0\ 1\ 0\ 1\ 1\ 1\ 0\ 1\ 1\ 0\ 1\ 0)$	16 -4 0 4 0 -4 0 4 -16 4 0 -4 0 4 0 4 -4
$C_7 = (0\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 1\ 1\ 1)$	16 4 0 -4 0 4 0 -4 -16 -4 0 4 0 -4 0 4
$C_8 = (1\ 0\ 1\ 1\ 1\ 0\ 1\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 1)$	16 -4 0 4 0 -4 0 4 -16 4 0 -4 0 4 0 -4
$C_9 = (0\ 0\ 1\ 1\ 0\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 1\ 0\ 0\ 0)$	16 4 0 4 0 -4 0 -4 -16 -4 0 -4 0 4 0 4
$C_{10} = (0\ 0\ 1\ 0\ 1\ 0\ 0\ 1\ 1\ 1\ 0\ 1\ 0\ 1\ 1\ 0)$	16 -4 0 -4 0 4 0 4 -16 4 0 4 0 -4 0 -4
$C_{11} = (1\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 1\ 1\ 1\ 1\ 0)$	16 4 0 4 0 -4 0 -4 -16 -4 0 -4 0 4 0 4
$C_{12} = (1\ 0\ 1\ 1\ 1\ 0\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 1\ 1\ 0)$	16 -4 0 -4 0 4 0 4 -16 4 0 4 0 -4 0 -4
$C_{13} = (0\ 1\ 0\ 0\ 0\ 0\ 1\ 1\ 1\ 0\ 1\ 1\ 1\ 1\ 0\ 0)$	16 4 0 -4 0 4 0 -4 -16 -4 0 4 0 -4 0 4
$C_{14} = (1\ 0\ 0\ 0\ 1\ 0\ 0\ 1\ 0\ 1\ 1\ 1\ 0\ 1\ 1\ 0)$	16 -4 0 4 0 -4 0 4 -16 4 0 -4 0 4 0 -4
$C_{15} = (0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 1\ 1\ 1\ 0\ 1\ 1\ 1)$	16 4 0 -4 0 4 0 -4 -16 -4 0 4 0 -4 0 4
$C_{16} = (1\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 1\ 1\ 0\ 1\ 1\ 1\ 0)$	16 -4 0 4 0 -4 0 4 -16 4 0 -4 0 4 0 -4

FIG. 20B

$R(\tau)$	τ	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$R_E(\tau)$		16	4	0	4	0	-4	0	-4	-16	-4	0	-4	0	4	0	4
$R_F(\tau)$		16	-4	0	-4	0	4	0	4	-16	4	0	4	0	-4	0	-4
$R_G(\tau)$		16	4	0	-4	0	4	0	-4	-16	-4	0	4	0	-4	0	4
$R_H(\tau)$		16	-4	0	4	0	-4	0	4	-16	4	0	-4	0	4	0	-4

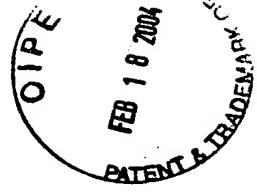


FIG. 20C

Bit #	Npilot = 6						Npilot = 8							
	0	1	2	3	4	5	0	1	2	3	4	5	6	7
Slot #1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
2	1	1	0	1	1	1	1	1	1	0	1	1	1	1
3	1	0	0	1	1	0	1	0	1	0	1	1	1	0
4	1	1	0	1	1	1	1	1	1	0	1	1	1	1
5	1	1	1	1	1	0	1	1	1	1	1	1	1	0
6	1	1	0	1	0	0	1	1	1	0	1	0	1	0
7	1	1	1	1	1	0	1	1	1	1	1	1	1	0
8	1	1	0	1	1	1	1	1	1	0	1	1	1	1
9	1	0	0	1	0	1	1	0	1	0	1	0	1	1
10	1	0	1	1	0	0	1	0	1	1	1	0	1	0
11	1	1	1	1	0	1	1	1	1	1	1	0	1	1
12	1	0	1	1	0	0	1	0	1	1	1	0	1	0
13	1	0	0	1	0	1	1	0	1	0	1	0	1	1
14	1	0	1	1	1	1	1	0	1	1	1	1	1	1
15	1	0	0	1	0	1	1	0	1	0	1	0	1	1
16	1	0	1	1	0	0	1	0	1	1	1	0	1	0

FIG. 20D

Npilots	Pilot bit position #	Corresponding word of length 16
6	1	C ₁
	2	C ₂
	4	C ₃
	5	C ₄
8	1	C ₁
	3	C ₂
	5	C ₃
	7	C ₄

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FIG. 20E

Symbol rate	8ksps		16,32,64,128ksps				256,512,1024ksps								
Symbol #	0	1	0	1	2	3	0	1	2	3	4	5	6	7	
Slot #1	11	11	11	11	11	10	11	11	11	10	11	00	11	01	
	2	11	10	11	10	11	11	11	10	11	11	00	11	10	
	3	11	00	11	00	11	10	11	00	11	10	11	11	11	
	4	11	10	11	10	11	11	11	10	11	11	10	11	11	
	5	11	11	11	11	11	10	11	11	11	10	11	10	01	
	6	11	10	11	10	11	00	11	10	11	00	11	01	11	00
	7	11	11	11	11	11	10	11	11	11	10	11	10	01	
	8	11	10	11	10	11	11	11	10	11	11	11	11	00	
	9	11	00	11	00	11	01	11	00	11	01	11	11	10	
	10	11	01	11	01	11	00	11	01	11	00	11	11	01	
	11	11	11	11	11	01	11	11	11	01	11	00	11	00	
	12	11	01	11	01	11	00	11	01	11	00	11	01	11	00
	13	11	00	11	00	11	01	11	00	11	01	11	01	11	10
	14	11	01	11	01	11	11	11	01	11	11	10	11	11	
	15	11	00	11	00	11	01	11	00	11	01	11	01	11	10
	16	11	01	11	01	11	00	11	01	11	00	11	00	11	11

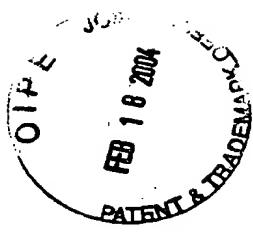


FIG. 20F

Symbol rate	2048,4096ksps															
Symbol #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Slot #1	11	11	11	10	11	00	11	01	11	00	11	11	11	01	11	01
2	11	10	11	11	11	00	11	10	11	00	11	10	11	10	11	00
3	11	00	11	10	11	11	11	11	11	11	11	01	11	00	11	00
4	11	10	11	11	11	10	11	11	11	10	11	01	11	00	11	01
5	11	11	11	10	11	10	11	01	11	01	11	01	11	01	11	10
6	11	10	11	00	11	01	11	00	11	10	11	00	11	00	11	00
7	11	11	11	10	11	10	11	01	11	10	11	00	11	10	11	00
8	11	10	11	11	11	11	11	00	11	11	11	11	11	11	11	01
9	11	00	11	01	11	11	11	10	11	11	11	00	11	10	11	10
10	11	01	11	00	11	11	11	01	11	11	11	01	11	01	11	11
11	11	11	11	01	11	00	11	00	11	00	11	10	11	11	11	11
12	11	01	11	00	11	01	11	00	11	01	11	10	11	11	11	10
13	11	00	11	01	11	01	11	10	11	10	11	10	11	10	11	01
14	11	01	11	11	11	10	11	11	11	01	11	11	11	11	11	11
15	11	00	11	01	11	01	11	10	11	01	11	11	11	01	11	11
16	11	01	11	00	11	00	11	11	11	00	11	00	11	00	11	10

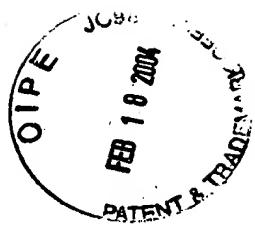


FIG. 20G

Symbol rate	Symbol #	Channel	Corresponding word of length 16
8ksps	1	I - CH	C ₁
		Q - CH	C ₂
16, 32, 64, 128ksps	1	I - CH	C ₁
		Q - CH	C ₂
	3	I - CH	C ₃
		Q - CH	C ₄
256, 512, 1024ksps	1	I - CH	C ₁
		Q - CH	C ₂
	3	I - CH	C ₃
		Q - CH	C ₄
	5	I - CH	C ₅
		Q - CH	C ₆
	7	I - CH	C ₇
		Q - CH	C ₈
2048, 4096ksps	1	I - CH	C ₁
		Q - CH	C ₂
	3	I - CH	C ₃
		Q - CH	C ₄
	5	I - CH	C ₅
		Q - CH	C ₆
	7	I - CH	C ₇
		Q - CH	C ₈
	9	I - CH	C ₉
		Q - CH	C ₁₀
	11	I - CH	C ₁₁
		Q - CH	C ₁₂
	13	I - CH	C ₁₃
		Q - CH	C ₁₄
	15	I - CH	C ₁₅
		Q - CH	C ₁₆

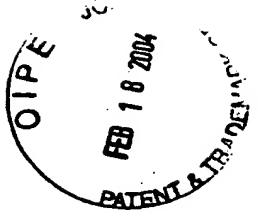


FIG. 20H

Symbol #	0	1	2	3
Slot #1	11	11	11	10
2	11	10	11	11
3	11	00	11	10
4	11	10	11	11
5	11	11	11	10
6	11	10	11	00
7	11	11	11	10
8	11	10	11	11
9	11	00	11	01
10	11	01	11	00
11	11	11	11	01
12	11	01	11	00
13	11	00	11	01
14	11	01	11	11
15	11	00	11	01
16	11	01	11	00

FIG. 20I

Symbol #	Channel	Corresponding word of length 16
1	I-CH	C ₁
	Q-CH	C ₂
3	I-CH	C ₃
	Q-CH	C ₄



FIG. 21

Frame Synchronization Words	
L=15 , Slot No.	1 2 3 4 15
$C_1 = (1\ 0\ 0\ 0\ 1\ 1\ 1\ 1\ 0\ 1\ 0\ 1\ 1\ 0\ 0)$	
$C_2 = (1\ 0\ 1\ 0\ 0\ 1\ 1\ 0\ 1\ 1\ 1\ 0\ 0\ 0\ 0)$	
$C_3 = (1\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 1\ 1\ 0\ 1\ 0\ 1\ 1)$	
$C_4 = (0\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 1\ 1\ 1\ 0\ 1\ 1)$	
$C_5 = (1\ 1\ 1\ 0\ 1\ 0\ 1\ 1\ 0\ 0\ 1\ 0\ 0\ 0\ 1)$	
$C_6 = (1\ 1\ 0\ 1\ 1\ 1\ 0\ 0\ 0\ 0\ 1\ 0\ 1\ 0\ 0)$	
$C_7 = (1\ 0\ 0\ 1\ 1\ 0\ 1\ 0\ 1\ 1\ 1\ 1\ 0\ 0\ 0)$	
$C_8 = (0\ 0\ 0\ 0\ 1\ 1\ 1\ 0\ 1\ 1\ 0\ 0\ 1\ 0\ 1)$	

FIG. 22A

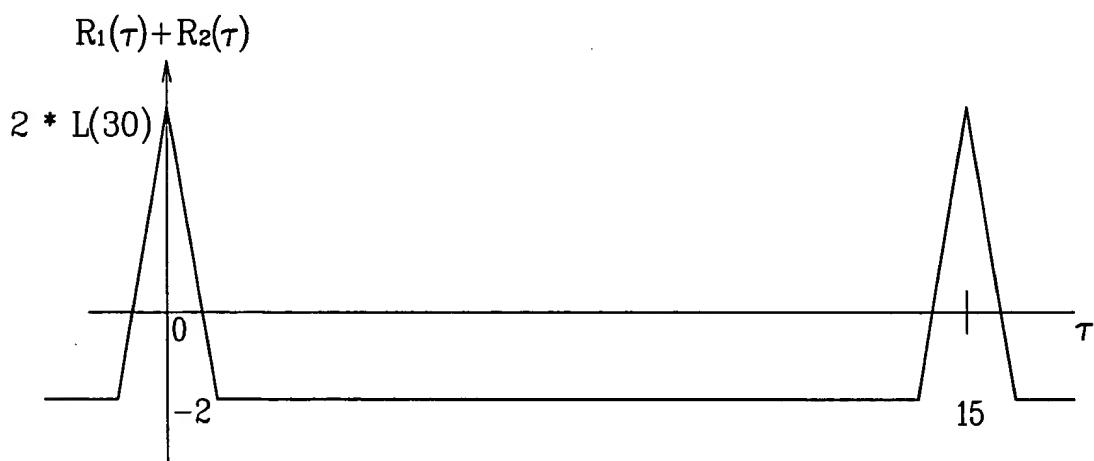


FIG. 22B

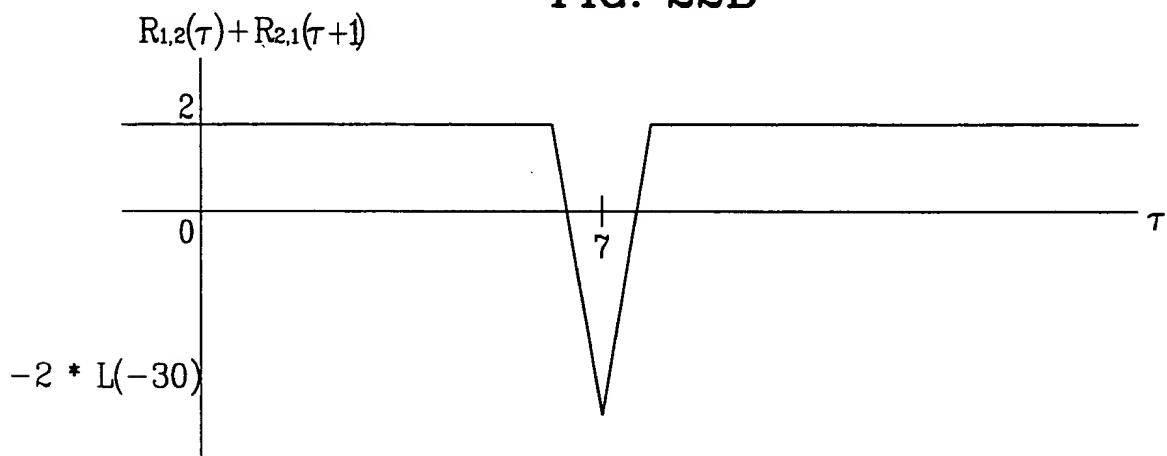




FIG. 22C

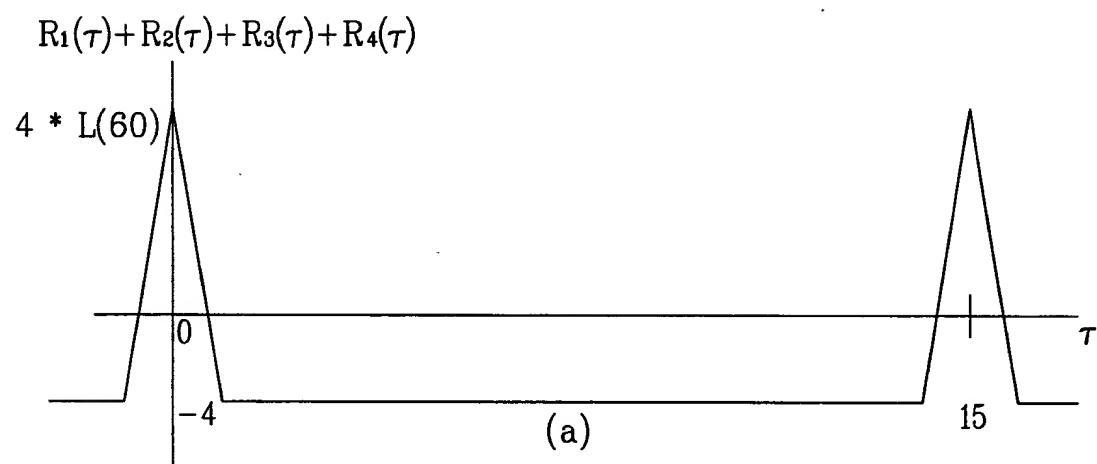
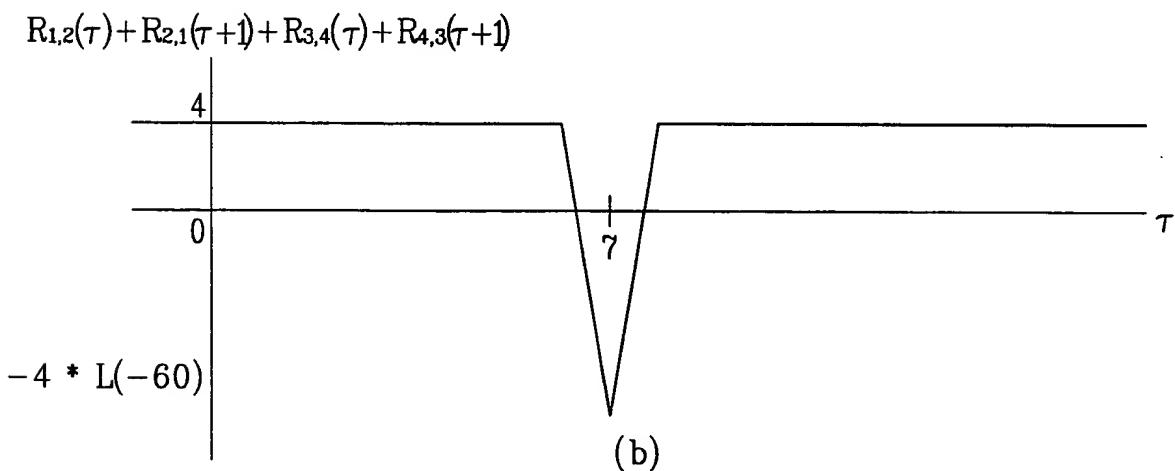


FIG. 22D



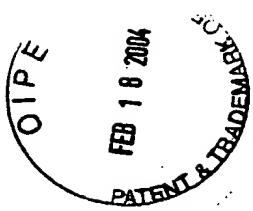


FIG. 23A

Bit #	Npilot = 2			Npilot = 3			Npilot = 4		
	0	1	0	1	2	0	1	2	3
Slot #1	1	1	1	1	1	1	1	1	1
2	0	0	0	1	0	1	0	1	0
3	0	1	0	1	1	1	0	1	1
4	0	0	0	1	0	1	0	1	0
5	1	0	1	1	0	1	1	1	0
6	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1
8	1	0	1	1	0	1	1	1	0
9	0	1	0	1	1	1	0	1	1
10	1	1	1	1	1	1	1	1	1
11	0	1	0	1	1	1	0	1	1
12	1	0	1	1	0	1	1	1	0
13	1	0	1	1	0	1	1	1	0
14	0	0	0	1	0	1	0	1	0
15	0	0	0	1	0	1	0	1	0

FIG. 23B

Npilot	Pilot bit position #	Corresponding word of length 15
2	0	C ₁
	1	C ₂
3	0	C ₁
	2	C ₂
4	1	C ₁
	3	C ₂



FIG. 23C

Bit #	Npilot = 2			Npilot = 3			Npilot = 4		
	0	1	0	1	2	0	1	2	3
Slot #1	1	1	1	1	1	1	1	1	1
2	1	0	0	1	0	1	0	1	0
3	1	1	0	1	1	1	0	1	1
4	1	0	0	1	0	1	0	1	0
5	1	0	1	1	0	1	1	1	0
6	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1
8	1	0	1	1	0	1	1	1	0
9	1	1	0	1	1	1	0	1	1
10	1	1	1	1	1	1	1	1	1
11	1	1	0	1	1	1	0	1	1
12	1	0	1	1	0	1	1	1	0
13	1	0	1	1	0	1	1	1	0
14	1	0	0	1	0	1	0	1	0
15	1	0	0	1	0	1	0	1	0

FIG. 23D

Npilot	Pilot bit position #	Corresponding word of length 15
2	1	C ₁
3	0	C ₁
	2	C ₂
4	1	C ₁
	3	C ₂

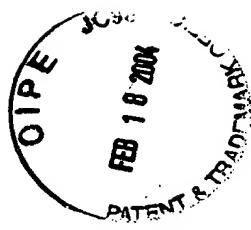


FIG. 23E

Bit #	Npilot = 5					Npilot = 6					
	0	1	2	3	4	0	1	2	3	4	5
Slot #1	1	1	1	1	0	1	1	1	1	1	0
2	0	0	1	1	0	1	0	0	1	1	0
3	0	1	1	0	1	1	0	1	1	0	1
4	0	0	1	0	0	1	0	0	1	0	0
5	1	0	1	0	1	1	1	0	1	0	1
6	1	1	1	1	0	1	1	1	1	1	0
7	1	1	1	0	0	1	1	1	1	0	0
8	1	0	1	0	0	1	1	0	1	0	0
9	0	1	1	1	0	1	0	1	1	1	0
10	1	1	1	1	1	1	1	1	1	1	1
11	0	1	1	0	1	1	0	1	1	0	1
12	1	0	1	1	1	1	1	0	1	1	1
13	1	0	1	0	0	1	1	0	1	0	0
14	0	0	1	1	1	1	0	0	1	1	1
15	0	0	1	1	1	1	0	0	1	1	1

FIG. 23F

Bit #	Npilot = 7						Npilot = 8							
	0	1	2	3	4	5	6	0	1	2	3	4	5	6	7
Slot #1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
2	1	0	0	1	1	0	1	1	0	1	0	1	1	1
3	1	0	1	1	0	1	1	1	0	1	1	1	0	1
4	1	0	0	1	0	0	1	1	0	1	0	1	0	1
5	1	1	0	1	0	1	1	1	1	0	1	0	1	1
6	1	1	1	1	1	0	1	1	1	1	1	1	1	0
7	1	1	1	1	0	0	1	1	1	1	1	0	1	0
8	1	1	0	1	0	0	1	1	1	0	1	0	1	0
9	1	0	1	1	1	0	1	1	0	1	1	1	1	0
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	0	1	1	0	1	1	1	0	1	1	1	0	1
12	1	1	0	1	1	1	1	1	1	0	1	1	1	1
13	1	1	0	1	0	0	1	1	1	0	1	0	1	0
14	1	0	0	1	1	1	1	1	0	1	0	1	1	1
15	1	0	0	1	1	1	1	1	0	1	0	1	1	1



FIG. 23G

Npilot	Pilot bit position #	Corresponding word of length 15
5	0	C ₁
	1	C ₂
	3	C ₃
	4	C ₄
6	1	C ₁
	2	C ₂
	4	C ₃
	5	C ₄
7	1	C ₁
	2	C ₂
	4	C ₃
	5	C ₄
8	1	C ₁
	3	C ₂
	5	C ₃
	7	C ₄

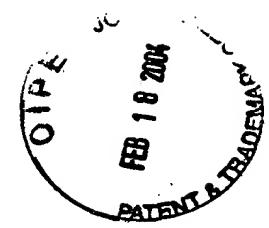


FIG. 23H

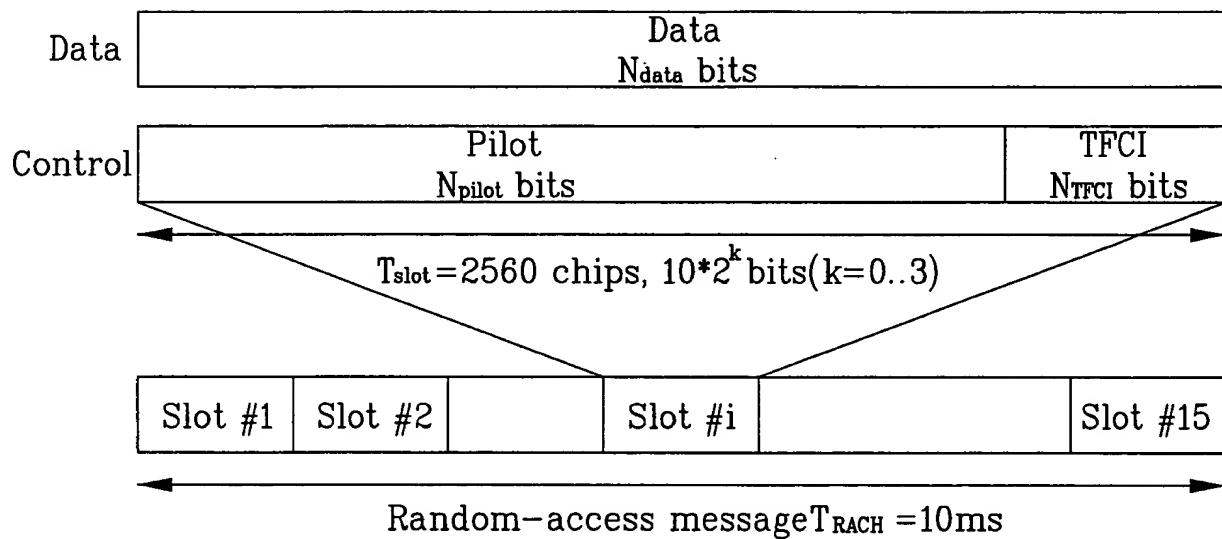


FIG. 23I

Channel Bit Rate(kbps)	Channel Symbol Rate(ksps)	SF	Bits/Frame	Bits/Slot	N_{pilot}	N_{TFCI}
15	15	256	150	10	8	2

FIG. 23J

Bit #	0	1	2	3	4	5	6	7
Slot #1	1	1	1	1	1	1	1	0
2	1	0	1	0	1	1	1	0
3	1	0	1	1	1	0	1	1
4	1	0	1	0	1	0	1	0
5	1	1	1	0	1	0	1	1
6	1	1	1	1	1	1	1	0
7	1	1	1	1	1	0	1	0
8	1	1	1	0	1	0	1	0
9	1	0	1	1	1	1	1	0
10	1	1	1	1	1	1	1	1
11	1	0	1	1	1	0	1	1
12	1	1	1	0	1	1	1	1
13	1	1	1	0	1	0	1	0
14	1	0	1	0	1	1	1	1
15	1	0	1	0	1	1	1	1



FIG. 24A

Symbol #	N _{pilot} = 2		N _{pilot} = 4		N _{pilot} = 8			N _{pilot} = 16							
	0	0 1	0	1	2	3	0	1	2	3	4	5	6	7	
Slot #1	11	11 11	11	11	11	10	11	11	11	10	11	11	11	10	
2	00	11 00	11	00	11	10	11	00	11	10	11	11	11	00	
3	01	11 01	11	01	11	01	11	01	11	01	11	10	11	00	
4	00	11 00	11	00	11	00	11	00	11	00	11	01	11	10	
5	10	11 10	11	10	11	01	11	10	11	01	11	11	11	11	
6	11	11 11	11	11	11	10	11	11	11	10	11	01	11	01	
7	11	11 11	11	11	11	00	11	11	11	00	11	10	11	11	
8	10	11 10	11	10	11	00	11	10	11	00	11	10	11	00	
9	01	11 01	11	01	11	10	11	01	11	10	11	00	11	11	
10	11	11 11	11	11	11	11	11	11	11	11	11	00	11	11	
11	01	11 01	11	01	11	01	11	01	11	01	11	11	11	10	
12	10	11 10	11	10	11	11	11	10	11	11	11	00	11	10	
13	10	11 10	11	10	11	00	11	10	11	00	11	01	11	01	
14	00	11 00	11	00	11	11	11	00	11	11	11	00	11	00	
15	00	11 00	11	00	11	11	11	00	11	11	11	10	11	01	

FIG. 24B

Symbol rate	Symbol	Channel	Corresponding word of length 15
N _{pilot} = 2	0	I-CH	C ₁
		Q-CH	C ₂
N _{pilot} = 4	1	I-CH	C ₁
		Q-CH	C ₂
N _{pilot} = 8	1	I-CH	C ₁
		Q-CH	C ₂
	3	I-CH	C ₃
		Q-CH	C ₄
N _{pilot} = 16	1	I-CH	C ₁
		Q-CH	C ₂
	3	I-CH	C ₃
		Q-CH	C ₄
	5	I-CH	C ₅
		Q-CH	C ₆
	7	I-CH	C ₇
		Q-CH	C ₈

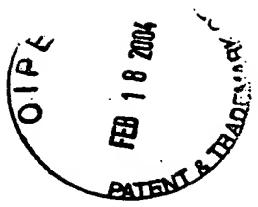


FIG. 24C

Symbol #	N _{pilot} = 4		N _{pilot} = 8				N _{pilot} = 16							
	0	1	0	1	2	3	0	1	2	3	4	5	6	7
Slot #1	01	10	11	00	00	10	11	00	00	10	11	00	00	10
2	10	10	11	00	00	01	11	00	00	01	11	10	00	10
3	11	10	11	11	00	00	11	11	00	00	11	10	00	11
4	10	10	11	10	00	01	11	10	00	01	11	00	00	00
5	00	10	11	11	00	11	11	11	00	11	11	01	00	10
6	01	10	11	00	00	10	11	00	00	10	11	11	00	00
7	01	10	11	10	00	10	11	10	00	10	11	01	00	11
8	00	10	11	10	00	11	11	10	00	11	11	10	00	11
9	11	10	11	00	00	00	11	00	00	00	11	01	00	01
10	01	10	11	01	00	10	11	01	00	10	11	01	00	01
11	11	10	11	11	00	00	11	11	00	00	11	00	00	10
12	00	10	11	01	00	11	11	01	00	11	11	00	00	01
13	00	10	11	10	00	11	11	10	00	11	11	11	00	00
14	10	10	11	01	00	01	11	01	00	01	11	10	00	01
15	10	10	11	01	00	01	11	01	00	01	11	11	00	11

FIG. 24D

Symbol rate	Symbol #	Channel	Corresponding word of length 15
N _{pilot} = 4	0	I-CH	-C ₁
		Q-CH	C ₂
N _{pilot} = 8	1	I-CH	-C ₃
		Q-CH	C ₄
	3	I-CH	C ₁
		Q-CH	-C ₂
N _{pilot} = 16	1	I-CH	-C ₃
		Q-CH	C ₄
	3	I-CH	C ₁
		Q-CH	-C ₂
	5	I-CH	-C ₇
		Q-CH	C ₈
	7	I-CH	C ₅
		Q-CH	-C ₆

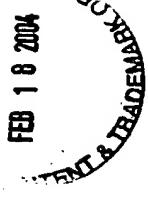


FIG. 25A

Symbol #	N _{pilot} = 8				N _{pilot} = 16							
	0	1	2	3	0	1	2	3	4	5	6	7
Slot #1	11	11	11	10	11	11	11	10	11	11	11	10
2	11	00	11	10	11	00	11	10	11	11	11	00
3	11	01	11	01	11	01	11	01	11	10	11	00
4	11	00	11	00	11	00	11	00	11	01	11	10
5	11	10	11	01	11	10	11	01	11	11	11	11
6	11	11	11	10	11	11	11	10	11	01	11	01
7	11	11	11	00	11	11	11	00	11	10	11	11
8	11	10	11	00	11	10	11	00	11	10	11	00
9	11	01	11	10	11	01	11	10	11	00	11	11
10	11	11	11	11	11	11	11	11	11	00	11	11
11	11	01	11	01	11	01	11	01	11	11	11	10
12	11	10	11	11	11	10	11	11	11	00	11	10
13	11	10	11	00	11	10	11	00	11	01	11	01
14	11	00	11	11	11	00	11	11	11	00	11	00
15	11	00	11	11	11	00	11	11	11	10	11	01

FIG. 25B

Symbol rate	Symbol #	Channel	Corresponding word of length 15
N _{pilot} = 8	1	I-CH	C ₁
		Q-CH	C ₂
	3	I-CH	C ₃
		Q-CH	C ₄
N _{pilot} = 16	1	I-CH	C ₁
		Q-CH	C ₂
	3	I-CH	C ₃
		Q-CH	C ₄
	5	I-CH	C ₅
		Q-CH	C ₆
	7	I-CH	C ₇
		Q-CH	C ₈

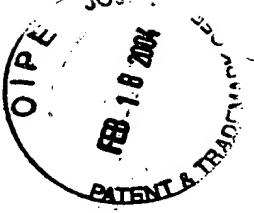


FIG. 25C

Symbol #	N _{pilot} = 8				N _{pilot} = 16							
	0	1	2	3	0	1	2	3	4	5	6	7
Slot #1	11	00	00	10	11	00	00	10	11	00	00	10
2	11	00	00	01	11	00	00	01	11	10	00	10
3	11	11	00	00	11	11	00	00	11	10	00	11
4	11	10	00	01	11	10	00	01	11	00	00	00
5	11	11	00	11	11	11	00	11	11	01	00	10
6	11	00	00	10	11	00	00	10	11	11	00	00
7	11	10	00	10	11	10	00	10	11	01	00	11
8	11	10	00	11	11	10	00	11	11	10	00	11
9	11	00	00	00	11	00	00	00	11	01	00	01
10	11	01	00	10	11	01	00	10	11	01	00	01
11	11	11	00	00	11	11	00	00	11	00	00	10
12	11	01	00	11	11	01	00	11	11	00	00	01
13	11	10	00	11	11	10	00	11	11	11	00	00
14	11	01	00	01	11	01	00	01	11	10	00	01
15	11	01	00	01	11	01	00	01	11	11	00	11

FIG. 25D

Symbol rate	Symbol #	Channel	Corresponding word of length 15
N _{pilot} = 8	1	I-CH	-C ₃
		Q-CH	C ₄
	3	I-CH	C ₁
		Q-CH	C ₂
	N _{pilot} = 16	I-CH	-C ₃
		Q-CH	C ₄
	3	I-CH	C ₁
		Q-CH	-C ₂
	5	I-CH	-C ₇
		Q-CH	C ₈
	7	I-CH	C ₅
		Q-CH	-C ₆

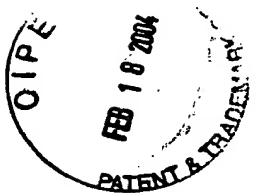
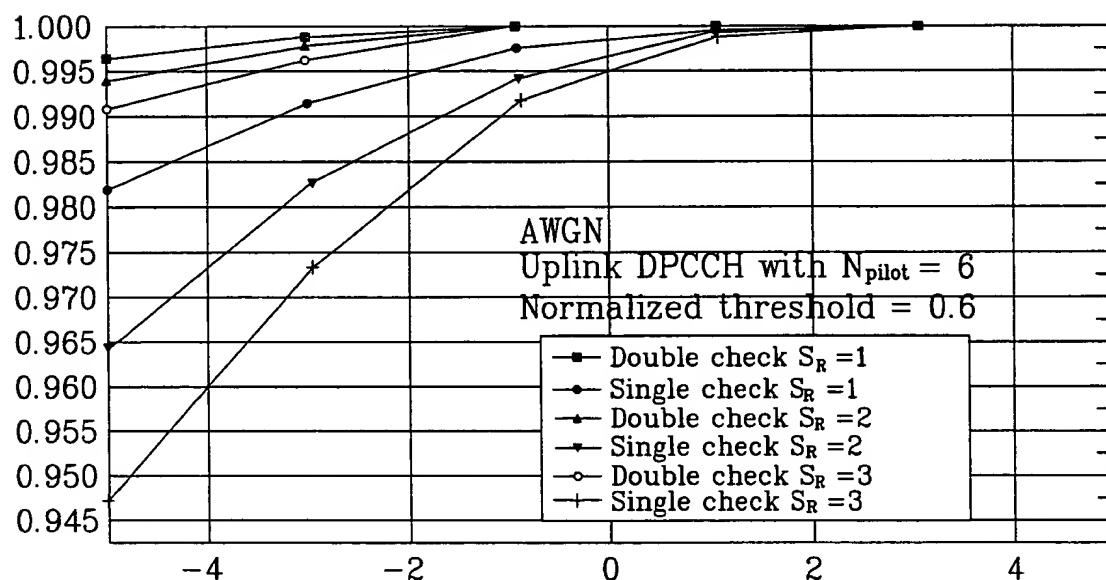


FIG. 26A

Parameters	Uplink
Number of slots per frame	15
Number of bits in the DPCCH(Pilot/TPC/TFCI/FBI)	6/2/2/0
Number of bits in the DPDCH per each slot	10
Spreading factor (DPDCH)	256
Spreading factor (DPCCH)	256
Modulation	HPSK
3dB bandwidth	3.84MHz
Shaping filter	Root raised cosine (roll off 0.22)
Power amplifier	Ideal
Propagation channel	AWGN

FIG. 26B



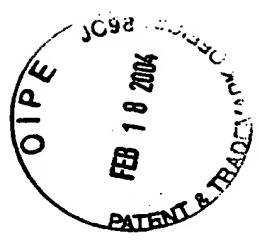


FIG. 26C

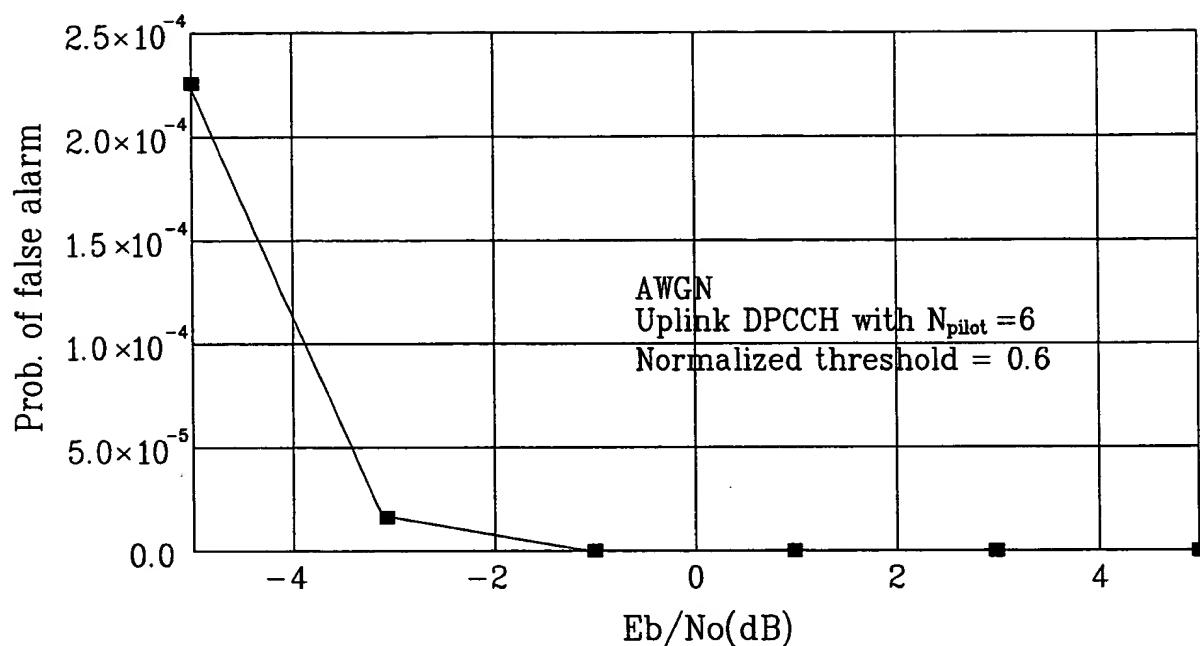




FIG. 27

Item	15 slots	16 slots
No. of slots per frame	15	16
No. of N _{slot} per slot	1)Uplink 2,3,4,5,6,7,8 2)Downlink 2,4,8,16	1)Uplink 5,6,7,8 2)Downlink 4,8,16,32
Slot-Slot possible?	Yes	Yes
Double-check possible?	Yes (Two correlators such as auto-correlator and cross-correlator are used)	Yes (Auto-correlator)
Single frame synchronization word can be used for frame synchronization?	Yes since a frame synchronization word has -1 out of phase coefficients	May not be feasible because of +4 or -4 out-of-phase coefficients. The +4 or -4 side lobes can be zero through some particular processing using preferred pair of frame synchronization words.
Frame synchronization words	All 8 frame synchronization words are made out of a single PN code	All 8 frame synchronization words have +4 or -4 out-of-phase coefficient and minus peak value at middle shift.
Autocorrelation function	R(τ)=16, $\tau=0$ R(τ)=-1, elsewhere	R(τ)=16, $\tau=0$ R(τ)=-16, $\tau=8$ R(τ)=0+4, or -4, elsewhere